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DIVISION OF RESEARCH SERVICES

ANNUAL REPORT
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United States.

PUBLIC HEALTH SERVICE - NATIONAL INSTITUTES OF HEALTH

DIVISION OF RESEARCH SERVICES

LIBRARY
JUL 27 1973
National Institutes of Health

Report of Program Activities
July 1, 1964, through June 30, 1965

A. Objectives

The objective of the Division is to provide a wide variety of scientific, technical, and engineering services to support and further the research programs of the National Institutes of Health. Since all of these services are geared to the needs of the Institute programs, the Division makes a continuing effort to keep informed of Institute plans. The Division's organization, staffing, and functions are adjusted accordingly to achieve an effective program of centralized service.

B. Current Programs

The Division of Research Services comprises some 1,300 persons with almost 200 individual occupational skills and is composed of an Office of the Chief and eight branches: Computation and Data Processing, Environmental Services, Biomedical Engineering and Instrumentation, Laboratory Aids, Library, Medical Arts and Photography, Plant Engineering, and Research Facilities Planning.

The programs of the Division can be divided into two broad classifications:

(1) Programs in direct support of research

- a. Design, development, and fabrication of instruments and materials
- b. Biomedical engineering of methods and systems
- c. Production of bacteriologic and tissue culture media
- d. Preparation of sterile glassware
- e. Production of genetically defined rodents and rabbits
- f. Quarantine and conditioning of dogs, cats, and primates
- g. Maintenance of farm animals
- h. Animal surgery and recovery
- i. Animal health services
- j. Still and motion picture photography
- k. Graphic arts services and exhibits design
- l. Medical illustration and model making
- m. Computer services for individual research projects
- n. Library services
- o. Foreign language translation

(2) Programs related to NIH facilities and proper environment

- a. Engineering liaison in the design and construction of new NIH facilities
- b. Development of improved facilities and equipment

c. Operation, alteration, and maintenance of the NIH facilities
d. Maintenance of the NIH grounds
e. Environmental services designed to maintain and improve the health of NIH patients and employees

C. Program Progress and Accomplishments

Construction

In providing engineering liaison in the design and construction of new NIH facilities, the Division is currently engaged in more than 20 major projects having a total estimated cost of over $75 million. During FY 1965 one major project, Phase I of the NIH Animal Center, was completed, and construction began on two others at NIH. These are an extension to the Division of Biologics Standards Building and Phase IA of the Master Utilities Extension. A four-story extension to Building 12 is nearing completion and will provide space in early FY 1966 for several offices and service-connected laboratories which now occupy valuable space in the Clinical Center. Design work was completed on several other projects for which construction contracts will be awarded in early FY 1966. These include the General Office Building Extension, a new Library Addition and Cafeteria Extension to the Clinical Center, and the NCI Building, NIMH/NINDB Building, and an associated cafeteria.

Improvements and Repair Program

A major increase in engineering workload resulted from implementation of the first NIH-directed improvement and major repair program. Although the overall demands for alterations in direct support of research declined, this type work performed by station labor increased. Modification of fume exhaust ducts and fire safety improvements in Building 10 and stairwell additions to Buildings 4, 5, 6, and 7 are but a few of the projects designed to improve the environment and safety of NIH facilities. Other larger improvements include renovation of the boiler plant, electrical services, and refrigeration facilities at the Rocky Mountain Laboratory and air conditioning of Building 265 at the Middle America Research Unit, Panama Canal Zone.

A continued effort also has been made in developing improved animal care facilities. Such work resulted in the development of new caging systems for the NIH Animal Center, a completely automated rat breeding cage, and a rodent classifier which automatically weighs and sorts mice to a pre-set standard.

NIH Animal Center

The first of a three-phase construction program was recently completed at the NIH Animal Center. This first phase consists of a Farm Animal Building, a Kennel Building, and a Central Utilities Building. These new facilities will provide a new opportunity, not previously possible, to use farm animals in medical research. Also, all dog and cat quarantine, which was previously housed on the reservation, will now be carried out at the Center.

Computation

In the third quarter of the fiscal year, computer manufacturers were formally invited to submit proposals for a new computer configuration for the central computer facility. The proposals are now being evaluated. It is anticipated that a contract will be awarded in this fiscal year, with installation being accomplished in phases during fiscal years 1966 and 1967.

A contract was awarded to Control Data Corporation for a CDC 3100/SS-100 hybrid computing system which will provide combined computational and analog-to-digital conversion capabilities to investigators in the Clinical Center. Priority in the use of the system will be given to the Section on Clinical Biophysics, NHI, which collaborated in the development of specifications and has the most immediate need for the capabilities provided by this system. Installation is scheduled for early FY 1966.

The computer training program introduced in 1963 was continued during the past year. The program, which utilizes an IBM 1620 computer, provides laboratory scientists with the opportunity to explore fully the implications of computer technology for their scientific problem solving. It has done much to bridge the gap between NIH laboratory scientists and the computer sciences, and response to it continues to be excellent. Approximately 150 scientists and other professional personnel have participated in the program to date. The Division continued to furnish key personnel to the group engaged in administrative and program planning associated with the pending activation of the Division of Computer Research and Technology.

Instrumentation Support

Because of the increasing demands for biomedical engineering services, several new programs and changes have been made within the Division. Improved workload reporting methods were established, thus allowing a more reliable forecasting of personnel needs, better distribution of resources, and more accurate indication of space requirements. The satellite instrument shop in Building 10 was relocated to larger quarters to accommodate additional personnel. This change should result in quicker service on routine and emergency jobs, with less overtime. In addition, a new split shift operation has resulted in better utilization of space and equipment and will result in significant savings in future requirements for capital equipment.

A pilot contract was also let to a commercial engineering firm to provide not only service, but also technical assistance and consultation with the company on a demand basis. This program has proven to be extremely beneficial to the NIH researchers and will be extended where possible.

Shop Service Improvements

To improve manpower utilization, a pilot project of pre-issuing shop materials has just been initiated. Heretofore, employees often waited in line at the shop stores when drawing out repair parts and construction materials. By pre-packaging and pre-issuing the required materials as part of the job planning process, it is believed that a considerable amount of the lost time can be recovered.

In conjunction with this, a tool control program was also implemented during the year. Its basic objective is to concentrate at a single management point all functions related to the control of tools and equipment. The program is designed to provide more effective and flexible tool utilization, a higher level of tool repair and safety, more effective use of funds available for tools and equipment, and improved security.

Library Services

The Library's collection was strengthened this past year by some 6,500 new books, and more than 2,800 journal titles are now received by the Library. Also, a significant number of long-overdue books were returned to circulation as a result of a more thorough procedure to retrieve such overdue materials. A Selection Review Committee, consisting of Library personnel and NIH scientists, was established to develop a more thorough review process in selecting new library materials.

An automation feasibility study of library services was made by the Management Policy Branch. The report recommended computerization of the repetitive processes within the Library, e.g., serial recording, acquisitions, cataloging, and circulation. Planning the effective implementation of such a program will be considered during the coming year.

Considerable time is being given to the planning for the new NIH Library facility.

Visual Communications

Both photographic and art services were strengthened during the year. Equipment for automating the development of photographic negatives and advanced time-saving equipment for binding 2" x 2" slides were installed. The expanded use of contractual arrangements has also resulted in more efficient service and, at the same time, in reducing overtime work.

To assist NIH scientists in their increasing efforts to analyze motion, a Vanguard motion analyzer was acquired. This piece of equipment allows a frame-by-frame analysis of action far too rapid for the eye to see, such as cavitation events.

During the year an average of two exhibits was designed each month. Five received overseas viewing. Two exhibits, "Histoplasmosis and Cryptococcosis," NIAID, and "Research Explores Peridontal Disease," NIDR, were award winners.

Environment Control

In some areas of research—the most important being surgery, patient care, and production of pathogen-free animals—personnel who shed pathogenic organisms cannot be utilized. Decisions to employ or not to employ, to transfer to other duties or not to transfer, which are based on the carrier state, are not only highly questionable from the technical standpoint but are untenable from the personnel-management standpoint. To avoid these problems, a device was developed and is now in use which will determine whether or not a person will shed pathogenic organisms during the course of his routine duties.

In some of the more promising areas of cancer chemotherapy, the patient's resistance to infection of any type is essentially destroyed as a side effect of the treatment. If the treatment is to have any chance of success, the patient must be kept in an almost germfree environment. NCI purchased a commercially fabricated plastic isolator which was good in concept but poor in actual performance. A concerted effort by NCI and DRS resulted in a device that provided the required environment, and the research program has been able to move forward with very gratifying results.

Animal Production

During 1965 the Division again produced and issued over one million laboratory rodents and rabbits. Many animals were bred to specific Institute requirements. Shifts in the production operation were closely geared throughout the year to Institute demands, which enabled the Division to better meet the needs of the Institutes. However, Institute requirements for all species except mice were considerably higher than previous years, and more animals had to be purchased from outside sources.

Germfree Animals

The number of germfree animals issued to NIH laboratories continues to increase. Nearly 614 animals were issued per month as compared to an average of 295 in last year's report. Current production is close to the maximum for the isolator space available, and it is anticipated that top production will be reached in FY 1966.

Animal Health

The Bordetella bronchiseptica vaccine which was prepared and put into use in the Strain 13 guinea pig colony in FY 1964 has continued to be highly effective in the prevention of pneumonia. No adverse effects of the vaccine have been detected, and no cases of pneumonia have been diagnosed since the vaccination program was initiated. Requests for the vaccine from laboratories outside of NIH have been answered by supplying the method of its preparation.

Several years of effort finally resulted in the isolation of the intestinal bacterium that is consistently found in association with mucoid enteritis of rabbits. It has been lyophilized and stored for more complete characterization and pathogenesis studies when time permits.

D. Problems

Construction

One of the most serious problems in the design program is the almost inevitable slippage which occurs in estimated progress schedules. This slippage, and the delay in the start of construction of the facility, defers implementation of the research program for the client Institute and very often results in construction costs greater than those estimated in the planning stage.

A thorough analysis of this slippage indicates that a major factor is the excessive time lost during plan review periods. The schedules for these review periods are established during the A/E negotiations and tend to take an overly optimistic view of what constitutes reasonable time for review by both the NIH and the PBS.

Project engineers are required to maintain close supervision of the design schedules, and vigorous efforts are made to accelerate the review periods at NIH and PBS. Shortage of sufficient personnel at PBS, particularly in certain disciplines such as the Estimates Division, continues to be a problem. Experience to date has shown that "on-the-board" reviews performed in the offices of the A/E are most effective in accelerating design reviews.

Management

There are three critical problems related to effective management of the Division: (1) the financial structure, (2) the lag between the time when research money is appropriated and funds to support that research are made available to DRS, and (3) personnel ceilings.

1. The Financial Structure

This Division is financed under three systems: formula reimbursement, nonformula reimbursement, and fee-for-service. The first two are included under the Management Fund, while the latter is a part of the PHS Service and Supply Fund referred to as the NIH Revolving Fund.

The theory behind formula reimbursement is that each I/D should contribute to the cost of a DRS service in relation to the number of its employees using that service. While the theory may have merit, it is not being applied. A review of the way we distribute our resources to the I/D's indicates that an Institute may contribute up to 15 percent toward the cost of an activity but use only 2 to 3 percent of its service. The Division has no control over the formula system now being used. It needs to be revised, and we plan to explore alternatives with the Financial Management Branch, OAM.

The second system, that of nonformula reimbursement, is used where the service or product is required by only a few I/D's at NIH, e.g., the sale of cats and dogs and tissue culture media. While this system provides for a more direct relationship between the user and the supplier, it presents a false cost picture in that labor is not included in the price of the product.

The third method, Revolving Fund financing, attempts to segregate the total cost of a product and pass these on directly to the consumer by establishing a predetermined fee. This system includes the cost of labor but does not include the cost of equipment because of its effect on the rate structure.

In summary, none of the present systems are satisfactory from an I/D viewpoint, nor do they really serve the needs of the DRS. During the coming year we will work with the Financial Management Branch and the OD to develop a financial structure which will be more equitable to the Institutes and more effective for the Division.

2. The Time Lag

All government organizations have the problem of developing a budget 15 to 18 months ahead of the year in which the funds will be used. This problem becomes more complex in a research organization which cannot predict the course of basic research that far ahead. Within the DRS a third complication is introduced. We must be geared to meet the demands of the bench scientist. In a few isolated instances he is able to predict what services he may require during the coming year. However, in the majority of instances we must try to guess his needs, and frequently we fail in this task. More importantly, each year Congress can and does change the degree of emphasis placed on health research. New programs are launched which could not be anticipated. While the money for these changes is generally included in the appropriation bills, the funds to support the additional technical services cannot be budgeted for another year and will not be available for two years.

One of our projects during FY 1966 will be to explore alternative means for better correlation of the estimated needs of the I/D's with those of the DRS so that we may maintain a "quick capability" service for intramural research.

3. Position Ceilings

This problem is not unique with the DRS; however, one portion of it presents an incongruity which we believe should be corrected. There are, at present, position ceilings under Revolving Fund financing. The concept of this type of financing is to provide the service as long as the demand is present. Certain backlogs existing in some of the areas in this Division could be eliminated if position ceilings under the Revolving Fund were lifted. The demand for our services increases daily, and the I/D's are willing to pay for what they get. Unfortunately, we find ourselves with artificial ceilings in an area where money is available, while at the same time there are several hundred vacancies throughout the NIH. We hope during this next year to explore this problem with the OD in an attempt to make better use of ceilings which are allocated to the NIH.

TABLE OF DRS PROJECTS
July 1, 1964, through June 30, 1965

Laboratory Aids Branch

Serial Number	Title
4.1	Effect of Various Day-Lengths on the Productivity of Mice
4.2	Establishing and Producing Germfree Hamsters
4.3	Breeding of the Stump-Tailed Macaque Monkey (*Macaca speciosa*) in Captivity
4.4	Evaluation of Programs for Immunization of Quarantine Dogs
4.5	Evaluation of *Shigella flexneri* Attenuated Vaccine
4.6	An Epizootic of Measles in a Colony of Rhesus Monkeys (*Macaca mulatta*)
4.7	Clinical Aspects of a Febrile Hemorrhagic Disease of Monkeys in a Quarantine Colony
4.8	Febrile Hemorrhagic Disease of Monkeys
4.9	Chronic Murine Pneumonia of the Albino Rat
4.10	Mucoid Enteritis of Rabbits
4.11	Study of Causes of Death in Strain 13 and Strain 2 Inbred Guinea Pig Colonies
4.12	Focal Necrosis of the Liver of Rabbits
4.13	A Study to Determine the Epizootiology of Tyzzer's Disease in Rabbits
4.14	Chronic Extrinsic Cardiac Denervation by Regional Neural Ablation
4.15	Diuretic Mechanisms in the Chronic Cardiac Denervated Dog

July 1, 1964 through June 30, 1965

PUBLIC HEALTH SERVICE - NATIONAL INSTITUTES OF HEALTH

DIVISION OF RESEARCH SERVICES

Summary of Branch Activities

1. DRS-2
Serial Number

2. PLANT ENGINEERING BRANCH

3. R. R. Holliday
Branch Chief

I. SUMMARY

During FY 1965 the Plant Engineering Branch stayed abreast of all service demands while increasing its personnel in only one instance, that of operating the newly opened central utility plant at the NIH Animal Center.

A major increase in engineering workload resulted from implementation of the first NIH-directed improvement and major repair program ($1,966,000 made available in March 1964). Although the overall demands for Institute/Division alterations in direct support of research declined, this type of work performed by station labor increased.

Some of the larger improvement projects planned during the year included two additions to Building 10--one to the present cafeteria and the other to accommodate relocation of the Library, now located on the 5th floor, Bldg. 10. These two projects are estimated to cost about $1.4 million. Other significant projects include: (1) renovation of the boiler plant, electrical services, and refrigeration facilities at the Rocky Mountain Laboratory, costing an estimated $150,000; (2) air conditioning of Building 265, Middle America Research Unit, Panama Canal Zone, costing $185,000; and (3) addition of stairwell exit facilities for both ends of Buildings 4, 5, 6, and 7, costing $642,700.

The Branch experienced increasing difficulty in recruiting and retaining skilled engineers, engineering technicians, and craftsmen.

II. BRANCH PROGRAMS

A. Objectives

The mission of the Plant Engineering Branch is to provide responsive support to the medical research mission of the National Institutes of Health by furnishing, as expeditiously and as economically as possible, the services described below:

B. Current Programs

Operation and Maintenance: These services consist of operating and maintaining the NIH physical, mechanical, electrical, architectural, and landscaping facilities.

Engineering: These services consist of developing and preparing plans and specifications for repairs, alterations, and improvements to NIH facilities, administering and inspecting work performed by private contractors, and providing engineering services as required.

Construction: These services consist of providing craft services (station labor) for altering, repairing, and improving NIH facilities.

C. Program Progress and Accomplishments

Construction By Station Shops: No additional personnel were employed during the year to supplement activities associated with alteration, improvement, and maintenance to facilities. However, an examination of material expenditures for these activities indicates that gross work output exceeded previous years. Chart No. I reports material expenditure trends by quarter since 1961.

A good measure of the adequacy or responsiveness of the station shops service is the work in backlog. Experience has shown that an eight-week backlog will allow the most responsive service without sacrificing efficiency. Charts No. II and No. III report the backlog trend for the central craft shops since January 1963. The relatively constant backlog of between nine and twelve weeks indicates that a very satisfactory service was provided during the past year.

Requests for these services are received in the form of written work requests and by telephone. Telephone requests are received by three decentralized area maintenance units for minor services such as clogged plumbing, light bulb replacement, air conditioning malfunctions, and utility leaks. All written requests are received by a central work reception office.

An average of 1500 telephone requests are received each week, while written orders average about 360 per week. Almost all telephone requests and about 60% of the written orders require little or no formal planning (plans, special material, or detailed estimates of labor). About 1% of the written orders, however, require the services of professional engineers for planning, and most of these projects are performed by private contractors rather than by station shops.

Construction By Private Contractors: Most large jobs of 400 man-hours or more and those requiring special skills not employed by the Plant Engineering Branch are performed by private contractors.

Work awarded since FY 1963 has been as follows:

Fiscal Year	No. of Contracts	Dollar Value
1963	271	1,500,000
1964	218	3,000,000 *
1965 (July thru March only)	90	660,000 **

* Includes Building 12A, a new permanent building costing $1,440,661.

** Awarded during the first three quarters FY 1965. It is estimated that

NATIONAL INSTITUTES OF HEALTH
Division of Research Services - Plant Engineering Branch

MATERIAL SUMMARY

Quarters (fiscal year)

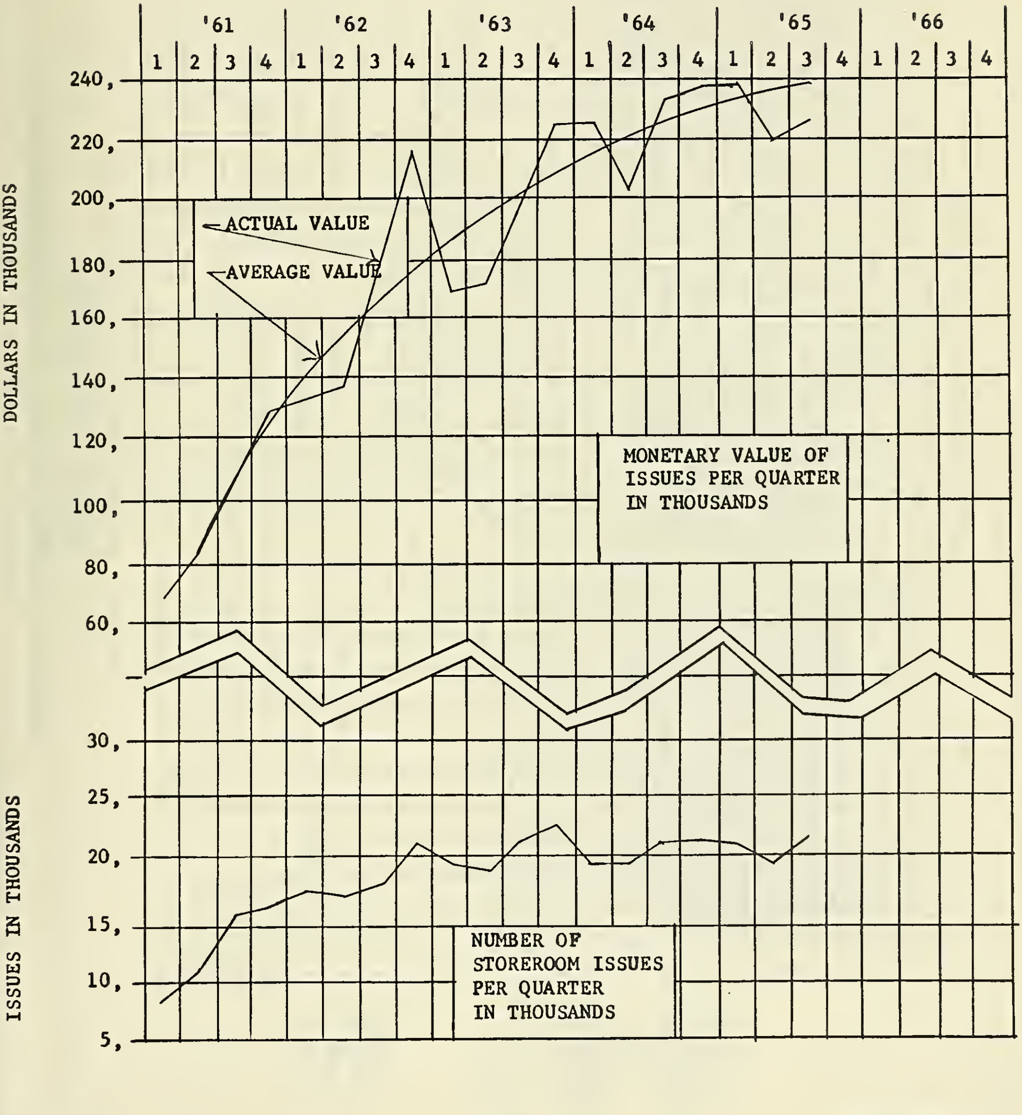


Chart No. I

NATIONAL INSTITUTES OF HEALTH
DIVISION OF RESEARCH SERVICES - PLANT ENGINEERING BRANCH

SHOP WORK BACKLOG SUMMARY

Reporting Period January 1963 thru April 1964

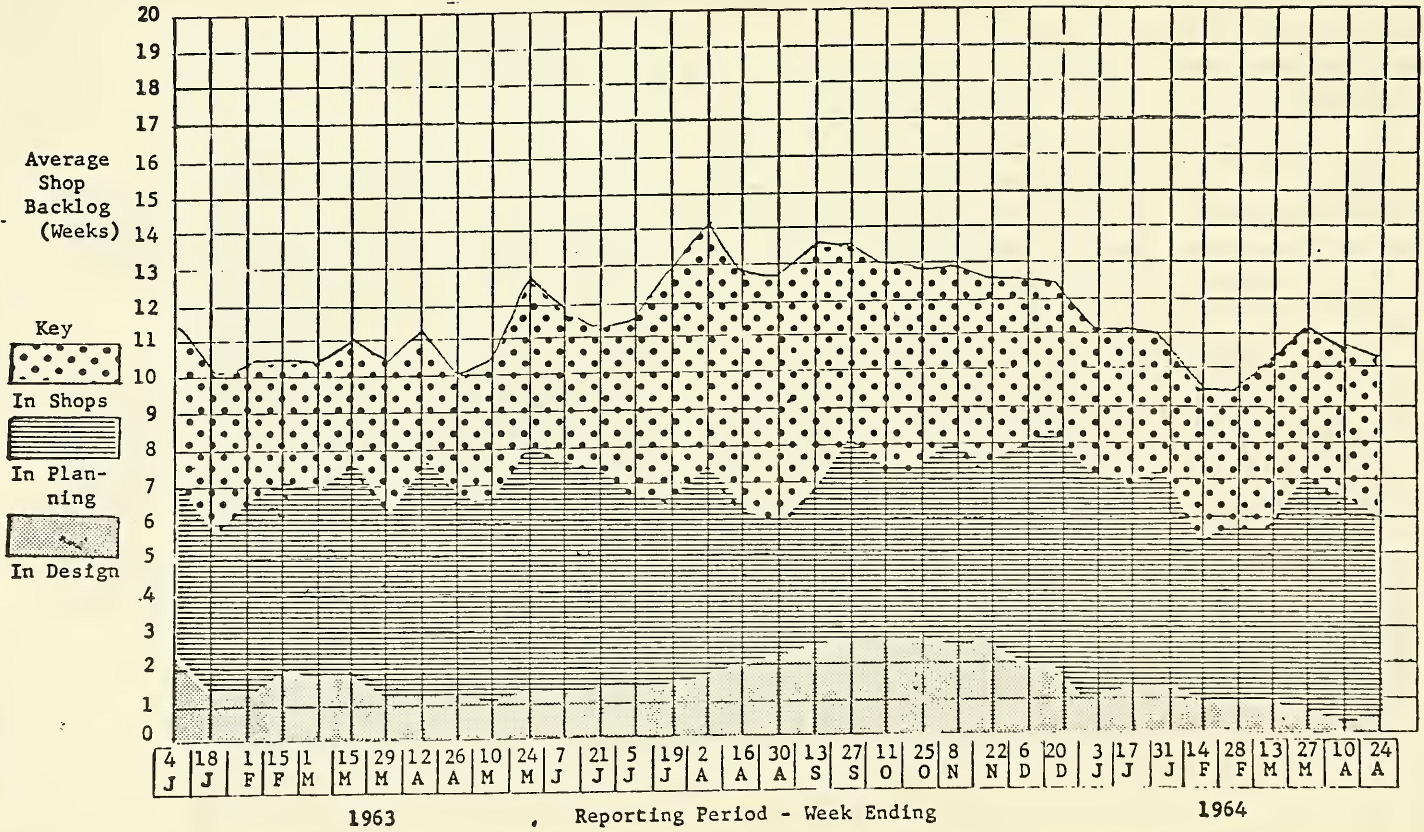
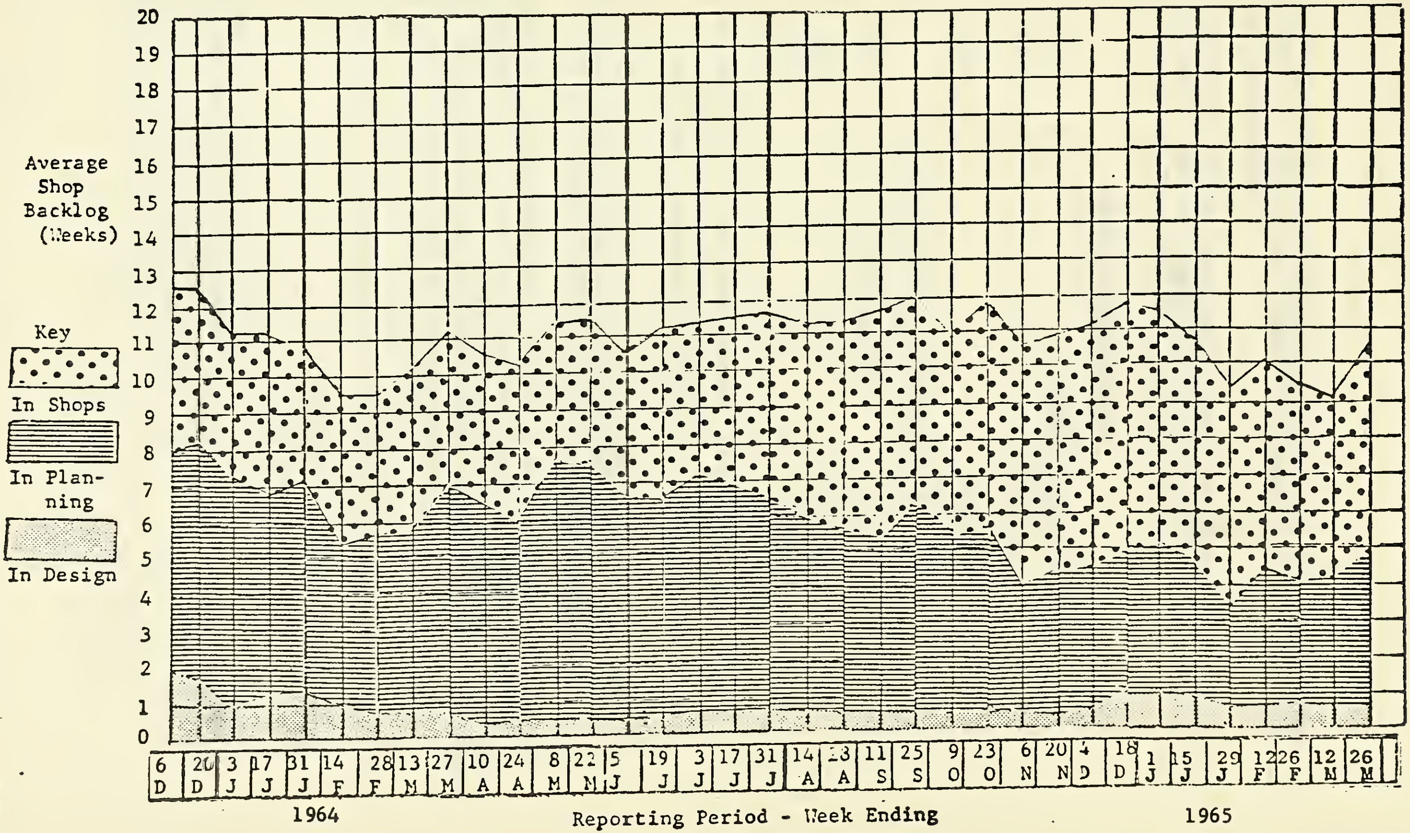


Chart No. II

NATIONAL INSTITUTES OF HEALTH
DIVISION OF RESEARCH SERVICES - PLANT ENGINEERING BRANCH

SHOP WORK BACKLOG SUMMARY

Reporting Period January 1964 to March 1965



about 20 more jobs totalling $1,800,000 will be awarded during the fourth quarter, including the Library and Cafeteria Extensions to Building 10 at an estimated cost of $1,400,000.

Alterations For Direct Research Support: An assessment of the trend of this service can be made by comparing, for the past three years, annual expenditures for station labor materials and contract work.

Station Labor Material

FY	Material Expenditures
1963	$437,790
1964	486,180
1965	500,000 *

Contract Expenditures (Awards)

FY	No. of Contracts	Costs
1963	212	$1,372,325
1964	126	659,458
1965	51	220,000 *

(* projected by extrapolation for 12 months. Actual expenditure for first nine months - Station Labor $349,520 - Contract $163,000)

From the above data it is clear that overall demands for this service have declined. Contract expenditures declined about 85% over FY 1963, while station labor, based on material expenditures, increased slightly.

Engineering Design Services: During the report period, the professional engineering staff of the Branch prepared plans and specifications for contracted work plus plans for the larger station labor projects. This staff also directed the design efforts of professional services contractors engaged by the Branch and reviewed the work of professional services contractors engaged by others for the design of NIH facilities.

A summary of the work for which design was completed during the period follows:

Type	Quantity Completed	Actual or Estimated Construction Cost
Professional Services Contracts	4	$342,000
Staff Design Projects for Contract Work	49	1,492,850
Staff Design Projects for Shop Work	52	54,250
Engineering Studies or Surveys	16	---
		$1,889,100

A few of the more important projects in each category of work are listed below:

	Alterations	Actual or Estimated Costs
1.	Install Electron Microscope Facility, Building 7	$16,400
2.	Alterations to Rooms 101-108, Auburn Bldg.	20,000
3.	Provide Nitrogen Supply Facility for Anaerobic Chamber, Building 3	20,000
4.	Alter Laboratory Facilities 12N200 Area, Building 10	30,000
5.	Install Computer Facilities 4th & 11th Floors, Building 10	58,000

	Plant Maintenance	
1.	Resurface Roofs, Bldgs. 14 & 28 Group	$47,000
2.	Road Improvement & Curbing, Quarters Area	46,000
3.	Resurface Various Roadways, Reservation	37,000
4.	Alterations to Freight Elevator #2, Bldg. 11	20,000
5.	Modify Fume Exhaust Ducts, Bldg. 10	25,000
6.	Install Steam Atomizing Burners, Bldg. 11	54,000

	Improvements	
1.	Air Condition Bldg. 265, Panama Canal Zone	$183,000
2.	Stairwell Additions, Bldgs. 4, 5, 6, and 7	642,700
3.	Communications Addition, Bldg. 10	58,000
4.	Fire Safety Improvements, Bldg. 10 (Phase I)	135,000

A few of the more important projects which are near completion are:

1.	Renovation of Air Conditioning System, Bldg. 6	$250,000
2.	Renovation of Boiler Plant, Rocky Mountain Lab.	60,000
3.	Library Addition & Cafeteria Extension, Bldg. 10	1,400,000
4.	Electrical Improvements, Rocky Mountain Lab.	35,000

5. Decentralization of Cold Room Refrigeration System, Rocky Mountain Lab. $40,000

A number of engineering surveys were made to establish the causes of localized problems of vibration, electrical interferences, and the like. Also, many investigations of feasibility and cost were made to assist in the preparation of budget requests.

During October 1964, engineering personnel of the Branch made an inspection of the physical plant of the Rocky Mountain Laboratory. Their findings included deficiencies in capacity and dependability in the basic utilities serving the facility and provided the basis for corrective action. The most urgently needed improvements are currently being designed.

Plant Operations: The plant operation and maintenance workload increased during the year as a result of the opening of the Central Utility Plant, the Kennel Building, the Farm Animal Building, and other miscellaneous facilities at the NIH Animal Center. Fourteen new employees were hired and trained for operating the plant 24 hours a day, 7 days a week. The new facilities were accepted for operation in March 1965.

Grounds: An extension of the drought this past year became an important aspect in the maintenance of NIH grounds. The two previous years, 1962 and 1963, were considered drought years, but 1964 proved to be the worst on record with a deficiency of more than eleven inches of rainfall. In terms of NIH grounds this is a shortage of more than 9 million gallons.

Extensive watering and attention during the year saved every major tree on the NIH Grounds temporarily, but each is in a weakened condition. Thus, insects and diseases which normally are not major problems have become a significant concern. A flare-up of the deadly Dutch Elm disease during the year is a good example. Two diseased trees were inoculated with an iodine preparation in an attempt to arrest this disease. Results are still uncertain.

American Elms are now being inoculated with a completely new, promising, systemic insecticide designed to kill the Elm Bark Beetle (the principal vector) before it can leave an infected tree and/or before it can infect a healthy tree. The material (Bidrin), which is injected directly into the sap stream, spreads throughout the tree evenly penetrating the outer bark to kill beetles before they can infect the sap stream. This treatment can only be administered by certified operators, trained at Rutgers and Maryland Universities. Four grounds employees have received this training.

Procurement Activity: An increase in PEB direct procurement activity (decentralized small purchase procedures) occurred during FY 1965. During the first three quarters of the year, the Shop Stores Unit, PEB, purchased directly 96% of all line items purchased involving 32% of the dollar value. During the last two quarters of FY 1964, direct purchases were 76% of the items and 22% of the dollar value. All procurement for the first nine months of this year totalled approximately 7000 line items costing $600,000. Total procurement for the year is expected to exceed $1,000,000.

D. Problems

Review of Controlled Maintenance Procedures: As part of the general reorganization of the Plant Engineering Branch in 1958-1960, modern management procedures, commonly referred to as "controlled maintenance procedures," were established. Some improvements in procedures were made in the intervening years, as well as the addition of other features made necessary by changes in character and volume of the workload.

During FY 1965 the written procedures were reviewed in detail and compared with actual practices. Draft revisions were then prepared to reflect the actual practices. In early FY 1966, these revisions will be incorporated in the Controlled Maintenance Manual of Procedures.

Pre-Issuing of Shop Material: Lost time has resulted from employees waiting in line at the Shop Stores issue counter when drawing out repair parts and construction materials. This is an area that has often been regarded as an acceptable inefficiency of the business. Some of this lost time, however, could be recovered through pre-packaging and pre-issuing material as part of the job planning process.

During FY 1965, preliminary steps were taken to begin pre-packaging material. The program will operate in the following manner:

1. For the jobs that lend themselves to the procedure, the planner-estimators will plan the work in much greater detail than before and will call out all standard stock material as well as special material.

2. Upon receipt of the orders, the shop planners will designate which items are to be packaged together and pre-issued. Normally the breakdown will be by craft specialization (plumbing, electrical, sheet metal, etc.). In some cases where a particular trade must stop work because of interference with other trades, the material for that trade will be pre-issued in more than one package.

3. The storekeepers will draw the material, package it as indicated by the shop planners, and move it to the special storage area to be held in custody storage. The storekeepers should be able to do this work when there is a lull at the regular issue counter.

4. When production work on the job is scheduled to begin, the craftsmen for each trade will draw out the appropriate package of pre-issued material with a minimum of waiting time.

The procedures outlined above will require more time expenditure by the planner-estimators and shop planners and less time expenditures by the storekeepers and craftsmen. The net result should represent a substantial savings.

A first trial job has been planned in detail and the procedures will be evaluated as the job progresses during the next several months. The plan for the coming year is to bring additional work under these procedures, to achieve the maximum degree of applicability and labor savings.

Tool Control Program: For several years there has been a need for better controls over tools and equipment used by personnel of the Branch. Major planning for a formal program was completed and implementation started during the year.

Basic objectives of the PEB Tool Control Program are to concentrate at a single management point all functions related to the control of tools and equipment. The program is designed to provide more effective and more flexible tool utilization, to achieve a high level of tool repair and safety, to achieve more effective use of funds for tools and equipment, and to improve security.

The specific items implemented are as follows:

1. The basic policies of the Tool Control Program were formulated and issued in the form of written instructions, PEB Instruction No. 28.

2. A position description for tool room mechanic was prepared and submitted for classification action. This is for the employee reporting to the Head, Shop Stores Unit, Planning and Control Section, who will be in charge of the program.

3. An enclosed and secure area on the first floor, north end of Building 13, has been set aside for the main tool room, and work was started on collecting some of the tools and equipment which will be stored and issued from that location.

4. Shelving and storage bins sufficient to get the program started were obtained.

5. Design of special forms for records and issuing and controlling tools was started.

Complete implementation of the Tool Program is planned for the coming year.

Development of Explosion-Safe Laboratory Refrigerators: The increasing incidence of explosions in laboratory refrigerators, including a serious fire and explosion at NIH several years ago, indicated the need for undercounter boxes that could be used safely for the storage of flammable materials. It was the practice at NIH to modify commercially available household type refrigerators to reduce the hazard, but these modifications were not always totally satisfactory.

During FY 1965 the specifications for laboratory refrigerators were rewritten, and a sufficient number of refrigerators to allow a production run were ordered from a small manufacturer in the hope that an improved product could be obtained. These efforts were successful, and the manufacturer produced a superior product. This box is approximately four cubic feet in capacity, with a porcelain steel finish on both interior and exterior surfaces, and is "explosion safe" in that it is designed to eliminate interior ignition sources. Additional efforts to improve the refrigerator include reducing noise, increasing the internal capacity from four cubic feet to six or more cubic feet without increasing the exterior dimensions, and providing an optional door swing from either side.

Grounds Maintenance, NIH Animal Center: No personnel or funds were provided in the FY 1965 or FY 1966 budgets for maintaining the grounds of the NIH Animal Center. Little additional support for the NIH Animal Center can be provided without further compromising the maintenance of the reservation, since the added workload created by the growth of the NIH reservation has been absorbed without additional manpower resources since 1959.

If resources are not provided for this function, every effort will be made to cut back other services provided by the Branch at the NIH reservation and transfer the personnel ceilings to the grounds function at the Animal Center. However, to some degree the following will result at the Animal Center:

(a) Soil building and erosion control, vitally needed, will not be provided.

(b) Lawns and plantings provided by new construction will not be maintained.

(c) Shelter belts, reforestation, fire and access lanes will not be built, planted or maintained.

Cost Accounting: The lack of an adequate cost accounting system needed to report expenditures of resources by function has hampered management of the Branch. It is expected that efforts started during the year to improve overall DRS workload reporting will relieve this deficiency; however, a centrally managed NIH system may be needed.

Personnel Recruitment: Recruitment of experienced professional engineers for management positions and mechanical and electrical engineering positions has not been totally adequate. The difficulty stems apparently from a shortage of engineers in these areas. As a long-range program, action has been taken to recruit and train junior engineers for these positions.

E. Program Plans

Operating Plans: Long- and short-range plans used to direct the day-to-day business of the Branch include: (a) operating budget and related reports, (b) daily reports from the preventive maintenance system as needed to generate the maintenance needs requiring immediate attention, and monthly and annual reports for major repair and improvement program plans, (c) weekly workload reports which reflect the estimated craft labor requirements by trade, (d) monthly workload reports which reflect the estimated engineering manpower requirements for engineering services by discipline, (e) weekly personnel status reports which report the available manpower by organizational unit resulting from personnel attrition and recruitment, and (f) monthly shop stores status reports. See also Section D, Problems.

F. Publications and Patents

None.

July 1, 1964 through June 30, 1965

PUBLIC HEALTH SERVICE - NATIONAL INSTITUTES OF HEALTH

DIVISION OF RESEARCH SERVICES

Summary of Branch Activities

1. DRS-3
Serial Number

2. MEDICAL ARTS AND PHOTOGRAPHY BRANCH

3. Malcolm S. Ferguson
Branch Chief

I. SUMMARY

During the year emphasis and attention were continued toward the goal of increasing both the amount of work accomplished as well as its quality. In addition to the usual on-the-job training and support of individuals taking formal course work related to their jobs, arrangements were made to bring in experts for one to two day seminar-type training sessions for selected personnel. NIH research activities are recognized as requiring the support of the best and latest techniques in photography and medical arts.

Both photographic and art services were strengthened during the past year. Equipment for automating the development of photographic negatives was installed, and several months of work experience with the process was accumulated. Advanced time-saving equipment for binding 2" x 2" slides was installed; thus, what formerly was a tedious hand job is now an almost automatic feed operation. This system also reduced the cost of producing cardboard mounted 2" x 2" slides.

The expanded use of contractual arrangements resulted in more efficient service to NIH researchers. These arrangements are used to perform work requiring large drafting jobs and in relieving pressure when the volume of requests grows beyond the capacity to complete the work in a reasonable period of time. This new plan has resulted in reducing overtime work to a minimum. Also, these arrangements have improved service to our customers, since nearly all work requests for drafting are now completed within a few days after receipt of the requests.

Recommendations from the Management Policy Branch study concerning exhibits suggested that MAPB continue those services which originally had been performed out of necessity but for which MAPB had no formal responsibility. This action is in the process of being codified.

A reorganization of the photography program has brought about a clarification of responsibilities. As a result, the motion picture and still photography activities have been given more vigor. The organizational structure of the Medical Arts Section appears to be inappropriate in light of current responsibilities and functions. Changes are therefore under consideration.

II. BRANCH PROGRAMS

A. Objectives

The objective of MAPB is to supply the research programs of NIH with visual records of biological or physical phenomena which are under study, to assist, through visual means, the dissemination of scientific information to professional groups, and to apply visual media for the public understanding of biomedical information.

B. Current Programs

The programs of the Branch embrace a wide spectrum of photographic and art services including: still and motion picture photography (both color and black and white) of clinical and laboratory research, information and public relations photography, slide making, photomicrography, photomacrography, graphics production, clinical illustration, general illustration, exhibits design, moulage, plastics fabrication, and motion picture editing and animation.

A few of the earlier completed motion pictures were refined and up-dated this year, including "Replacement of the Mitral Valve with DuPlessis Valve," "Total Replacement of the Aortic Valve with the Muller Prosthesis," and "Excision of the Right Ventricular Myxoma."

High-speed motion pictures of action far too rapid for the eye to see are being increasingly used by investigators for frame by frame research analysis.

The Branch now has the responsibility of coordinating the shipping, repair, and storage of exhibits, the maintenance of the exhibits' history file, and for calling attention to obsolescence of exhibits and their storage.

A new work request form was put into use during the year. It was to make possible the study by data processing of workloads, material cost, and information as to the laboratory or administrative unit requesting the work. Records of several months' work have been reduced to punched cards and reports made from them.

C. Program Progress and Accomplishments

The most visible change in MAPB has been the division of the Photography Section into two parts, the Motion Picture Section and the Still Photography Section. This reorganization has streamlined and clarified operational responsibilities. Since different equipment and skills are required for each section, there is a natural break in operational functions. The Photography Section has been further divided into a Camera Unit and a Laboratory Unit. This change has led to a sharpening of job responsibilities. The reorganization, however, has created a need to update every job description in both Sections.

Equipment for machine development of black and white still films and color cut films has been installed and is in operation. These sophisticated machines in the hands of a skilled operator automate the development of these films. The automated development of films has brought about a standardization of negative density among the still cameramen and has increased production. Now cameramen can devote full time to taking pictures. A cameraman no longer has to enter darkroom seclusion from time to time in order to develop his routinely exposed negatives. The negative-film-developing-machine operator, in turn, devotes his full attention to the machine and its operation to produce the best possible negatives from the combined work of several cameramen. Hand development of negatives is now done only in those instances where such custom handling is required by technical circumstances. Problems with automation were encountered, however, and will be described in the appropriate part of this report.

The acquisition of a machine to mount 2" x 2" slides in cardboard has increased the output of these items to commercial levels. Tedious, time consuming hand operations have been replaced with almost completely automatic machinery.

Following the general NIH policy of budget conservation, all requestors for motion picture service are asked for justification of the coverage. Before a project is undertaken, costs of production are estimated and submitted for approval to the appropriate Scientific Director.

Art work output increased this past year without the hiring of additional personnel. The use of contractual services was expanded for those drafting jobs requiring more than a few hours time. This action reduced overtime work and made it possible to accept and complete all other requests for drafting in only a few days. Another change which has kept drafting personnel from being monopolized by one individual is the new practice of doing no more than forty hours work in a six week period for any one individual.

The Management Policy Branch recommendations, based upon a study made of the NIH exhibits activity, asked that MAPB become the coordinating agency for the shipping, warehousing, and record keeping of exhibits, as well as for their original design. These recommendations are now in process of being implemented as official NIH policy.

This spring a rigorous equipment review was made in the Photography Section. As a result, more than 100 items of obsolete or unused equipment were declared surplus. Much needed shelf space therefore became available, and housekeeping became easier.

Photography's available space in Building 10 has been planned for more efficient operation. Work flow has been organized so that negatives produced by photomicrography, photomacrography and line copy cameras go to the next contiguous area where the films are developed.

MAPB art and photographic personnel collaborated on the production of a twenty minute animated motion picture "Design for Discovery," describing NIH activities. It was made using only still photographs. Animation techniques emphasizing pans and zooms plus pacing gives the "filmograph" a feeling of movement and visual variety. The same technique was used to produce two other shorter filmographs. These were in addition to the ongoing film reports from clinics and laboratories. Requests for short (60 second plus) films for TV showing increased during the year. Revision and updating of research report films like "Replacement of the Mitral Valve with the Starr-Edwards Ball Prothesis" and others continued. New motion picture research studies were also started on high speed cavitation in fluids and cardiac denervation.

Publications design continued as heretofore. Among the more widely distributed titles designed in MAPB are: "Facts about Osteoporosis," "Handbook for Visitors to the Clinical Center," "The National Institute of Dental Research," (100 pages), "People With a Purpose," "Peridontal Disease," and "The Public Health Service Today," an 84 page publication.

This past year an average of two exhibits was designed each month. Five received overseas viewing. Although 24 new exhibits were constructed, only six from former years were declared obsolete and were salvaged. Two exhibits - "Histoplasmosis and Cryptococcosis," NIAID, and "Research Explores Peridontal Disease," NIDR - won awards.

A "quickie-service" for drafting and graphics requiring two hours or less has been started. Instead of having these small jobs tossed into the hopper with the larger jobs to await their normal turn, they are handled on a special receipt basis, which allows this work to be finished in five working days or less.

Thirteen acrylic plastic castings of arthritic conditions in human hands were finished and are now part of a permanent NIAMD exhibit. In addition, two plastic models of abnormal and normal villi were completed. Forty color opthalmological drawings depicting the ocular evidence of neurological, circulatory, or malignant diseases were completed. The ocular manifestations of hereditary dystopic lipidosis also were reported in twenty corneal illustrations. A series of color illustrations of the 30 to 36 stages of each of three new species of malaria parasitism in monkeys has now been finished.

It has been a purpose of MAPB to keep informed of the latest developments in the field of photography. Various manufacturers have designed machines to assist a researcher in motion analysis. Among the sophisticated pieces of equipment that have recently appeared is the Vanguard motion analyzer. It makes analysis of serially photographed motion in both the x and y axis more precise and legible than any other previous device. One motion analyzer has been acquired and made available to research individuals for whom MAPB has taken motion picture records that require frame by frame analysis, i.e.: cavitation events and vocal cord movements. This equipment also has value for our own personnel who wish to ascertain directly the problem of analyzing specific motion picture records.

The counsel and guidance available from the fine and applied art services were used to advantage by a variety of NIH activities. In this connection, consultation was given in the development of the Kennedy Memorial plaque for NICHHD, in circulating art to decorate patients' rooms in the Clinical Center, and in replacing the clutter of signs on the reservation with signs of esthetic design.

Training of staff personnel takes several forms. On the job training is recognized and encouraged. Individuals are urged to enroll in formal courses that have direct relation to their work. Under this plan employees have taken courses in the Washington area at the Corcoran Gallery, the American University, and the U. S. Department of Agriculture. Elsewhere, institutions providing professional instruction, such as the Professional Photographers Association and Calvin Productions, also have been attended by MAPB personnel.

Another profitable training plan brings selected experts to MAPB for intensive lecture demonstrations. Examples are the instruction given by the Head of the Photographic Department at Guy's Hospital Medical School, England and the President of Wexler Film Productions, California.

D. Problems

Automation of the development of black and white negative materials has brought with it an unexpected problem namely, water quality. Before installing the automatic developers each man developed his own negatives using time, temperature, chemical controls, plus water. Under hand operating conditions of development, it was not realized that the water supplied NIH varied to such a degree in chemical and physical makeup. Machine development of negative materials requires a constant source of water that is physically clean and chemically stable. To keep from spoiling negatives from time to time, the water fed to the automatic developers must have a source of cleaner water than is currently available. Studies of the problem have been carried out, and a decision made to install additional filtration equipment.

Many months of study by a management specialist went into the design of a new work-order request form for MAPB. The purpose was to simplify the chore of the NIH customer and, more importantly, to make manhour totals and material costs readily and economically available through data processing. The new form has been in use for nearly a year. It has often proved irritating to MAPB patrons. Although the forms can be translated into punched card information for data processing, the procedure has proven to be somewhat costly. The question under consideration is whether obtaining somewhat more refined statistics warrants the clerical time involved and the machine expense.

E. Program Plans

During the coming year equipment for automating print processing will be installed. Continued support will be given to those activities concerning the technical capability to photograph serial events, which occur in microseconds.

A study will be made to determine the means whereby the file of photographic negatives accumulated over the years can be reduced in size so as to save space and at the same time make possible the ready retrieval of any one negative. Although the program will not apply to the active files they too should become more easy to use after the old materials are removed.

New equipment and techniques to reduce "chore work" in the art areas will be sought out and developed. The MAPB audiovisual resource file will be reviewed to determine the need for reorganization and the acquisition of new materials.

Attention will continue to be given to optics, photography, (both usual and nonconventional), and new photographic materials so as to be in a knowledgeable position to counsel with individuals who seek such information from MAPB.

A research and development program in the applications of photography to biomedical investigations is being considered. Needs are now being studied so as to develop a plan of action to attract suitably educated photoscientists into the MAPB organization.

Scriptwriters and motion picture directors will be employed on a temporary basis as needed. For example, a current film project is the script being prepared for the National Cancer Institute on the techniques used in collecting blood for platelet separation and the administration of platelets to leukemic patients.

F. Publications

Orem, Helen G.: Lightweight, hollow models of reinforced plaster. Curator. 7:282-286, 1964.

Wilcox, Marion A.: The plastic folio methods for mounting gross tissue. Curator. 7:321-326, 1964.

July 1, 1964, through June 30, 1965

PUBLIC HEALTH SERVICE - NATIONAL INSTITUTES OF HEALTH

DIVISION OF RESEARCH SERVICES

Summary of Branch Activities

1. DRS - 4
Serial Number

2. LABORATORY AIDS BRANCH

3. Dr. Robert J. Byrne
Branch Chief

I. SUMMARY

The Laboratory Aids Branch is responsible for the production of high quality laboratory rodents and rabbits; for the production of germfree and pathogen-free animals; for the quarantine and conditioning of dogs, cats, primates, and feral and farm animals; for preparation of bacteriologic and tissue culture media and clean glassware; and for special services related to the animal sciences.

Every effort has been made to meet the needs of the Institutes as to both quantity and types of animals, media, and glassware. But space and personnel limitations have finally brought about a quantitative leveling off of these services despite expanding Institute needs. Rodents and rabbits are being purchased increasingly from commercial sources. Certain types of media available outside, will also be purchased commercially. This will in turn enable the Laboratory Aids Branch to prepare at considerable dollar savings those types of media that are not readily available from outside sources. Greater use of disposable glassware has conserved both manpower and space for the cleaning and preparation of critically needed special items.

To support the basic service mission, the Laboratory Aids Branch conducts research and development programs as well as animal health programs. The research and development program designs and tests animal caging and automated equipment for the purpose of upgrading animal care standards, making more efficient use of manpower, and furnishing planning information for future facilities at the NIH Animal Center.

Animal health programs are designed to protect the quality of NIH closed colony animals and to aid in the disease control program in quarantined dogs, cats, primates, and farm animals. The latter program is a further safeguard to the health of animals in the Institute laboratories.

During this last fiscal year the Laboratory Aids Branch has accomplished its basic mission and initiated the transition to the NIH Animal Center. Occupation of Phase I construction by the Farm Animal Unit and Dog Quarantine is in progress. Phase IA, involving the Primate Quarantine building, is in the design stages. The Program of Requirements has been drafted for Phase II and includes plans for laboratory rodent production facilities designed with a barrier system to insure highest quality animals.

Although a variety of complex scientific and logistic problems constantly face the Laboratory Aids Branch, most can be and are being met through the talents and efforts of the staff. A still serious unresolved problem is that of dog and cat procurement. To protect the best interests of NIH and to upgrade the quality of animals being issued, alternative methods of production and procurement are being investigated.

II. BRANCH PROGRAMS

Production of Laboratory Rodents and Rabbits

A. Objectives

To furnish high quality laboratory rodents and rabbits by production in closed colonies under a systematic breeding program.

B. Current Programs

Production Program: During the past year the program has been directed toward the development of higher quality animals and special types. Volume increases were not possible due to space limitations.

Genetics Program: This program is designed to maintain the genetic integrity and desired features of the inbred lines of mice, rats, and guinea pigs. These characteristics are insured through the systematic use of immunogenetic testing and by maintaining a selective program. Close liaison is maintained with Institute investigators to determine suitability of issued inbred animals.

Wing 14F Program: Wing 14F is a modified structure which utilizes a modified barrier system and affords more security than that available in the conventional B, C, and E Wings. Animals raised in the Wing are from cesarean-derived parentage.

Planning Program for NIHAC Phase II: This program is concerned with the development of operational plans, equipment, training, and the logistics necessary to the implementation of the Phase II production facility at NIHAC.

C. Program Progress and Accomplishments

During FY 1965 the Laboratory Aids Branch again produced and issued over one million laboratory rodents and rabbits. Many animals were bred to specific Institute requirements. Shifts in the production operation were closely geared throughout the year to the Institute demands which enable LAB to better meet the needs of the Institutes.

However, Institute requirements for all species except mice were considerably higher than previous years, and more animals had to be purchased from outside sources.

Management practices and disease control methods continued to be effective throughout the year, resulting in a sales income in excess of operating expenses. During the year a reorganization took place within the Laboratory Aids Branch which effected a natural wedding between the production operation and the Genetics Unit, both of which are now integral parts of the Animal Production Section under a single leadership.

A new catalog of rodents and rabbits maintained in LAB was developed and distributed. Information regarding each strain of animal produced was updated, and the genetic characteristics of each strain were expanded and revised to include information obtained from a search of all the latest literature. Response to the catalog and requests since its publication have been gratifying.

A concerted effort has been made during the past year, through improved management practices, to increase productivity of the Genetics Unit. The results of this effort began to bear fruit in December when average production per inbred female was computed and found to be increasing. For example, during one month average production per female in rats was increased from 1.94 weaned offspring to 2.61. In mice the number of weaned offspring per female increased from 2.34 to 2.62, while guinea pigs increased from 0.45 to 0.54. The Genetics Unit is now coming closer to providing inbred strains for production than it has in many years.

The entire General Purpose mouse production colony is housed in Wing 14F. The cesarean-derived Osborne-Mendal rat colony started in early FY 1964 came into full production during the period covered by this report.

During the year effort has been directed to the completion of the Program of Requirements with RFPB for Phase II of the NIH Animal Center, which will provide facilities for animal production. Plans for a smooth transition and build-up of breeding colonies at the NIH Animal Center have been underway to insure that LAB will continue to meet Institute requirements of rodents and rabbits while at the same time developing breeding colonies of a pathogen-free nature at NIHAC. It is currently estimated that this developmental phase will require an extended transition period to prevent disruption of Institute programs. The research and development program, while related to this objective, is described in greater detail elsewhere in this report.

D. Problems

As reported last year, the Laboratory Aids Branch has encountered increasing difficulty in recruiting animal caretakers. Other agencies, hiring from the same certifications, utilize a wage board structure different from NIH and continue to successfully recruit the better qualified applicants. As a result LAB is having a great deal of difficulty in filling positions at the WB-2 level. This shortage of personnel in the Section has resulted in working hardships on employees to meet their work schedules and has increased operational costs by making large overtime crews necessary.

E. Program Plans

The development of transition and logistic support plans for the NIH Animal Center operation will dominate program operations during the next two years. New equipment must be developed and evaluated, methods of conversion from conventional to pathogen-free of many inbred strains must be developed and evaluated, and numerous personnel must undergo training for a pathogen-free operation prior to the completion of the NIHAC facility.

The production program during FY 1966 will be more closely controlled than ever before. During the Spring of FY 1965 Institute estimates for animals required in FY 1966 were obtained not only in terms of species but by strains. In previous years LAB knew the total number of inbred or non-inbred animals which would be required by Institutes but had no way of separating or judging the numbers of each strain within a species. The new control method should enable the production units to more efficiently meet the needs of the Institutes.

Production of Special Animals

Production of Germfree Animals

A. Objectives

To furnish germfree animals to NIH investigators; to develop and improve methods of producing, transferring, and using germfree animals; to aid investigators in starting germfree animal projects by loaning them equipment on a short-term basis.

B. Current Programs

The germfree animal production facilities have been operational since August 1963 in the specially designed rooms in Building 14G. Mice and rats are produced in germfree isolators under a breeding program parallel to that employed in the conventional colonies. Cesarean-derived guinea pigs are housed, but not bred, in germfree isolators.

The present production program is making greater use of plastic isolators in addition to the stainless steel units. The metal units will still constitute the backbone of the production colony, and the plastics will supplement this isolator space as needed. Some investigativ work is being done in the plastic units.

Although no one has been able to produce a germfree hamster, the need continues. Developmental work is underway to start hamsters in the germfree environment. This work is described in the accompanying project report.

C. Program Progress and Accomplishments

The number of germfree animals issued to NIH laboratories continues to increase and a total of 5,525 animals have been produced for the Institutes in the past nine months. This is nearly 614 animals per month compared to an average of 295 in last year's report. Current production is close to the maximum for the isolator space available. The highest month was December 1964 with 811 animals sent to the laboratories. Four new Reyniers-type units have been received to increase the isolator space available. These new units will be used to produce the inbred strains of animals. Production of animals is generally difficult and BALB/c, C3H, and C57Bl mice are the three inbred strains in demand now. The C3H mice were foster nursed on germfree NIH stock; therefore they have not been exposed to the mammary tumor agent for which they are noted. Because of Institute needs, it may be necessary to have two isolator colonies of C3H mice, one with the mammary tumor agent and one without.

The National Heart Institute and National Institute of Neurological Diseases and Blindness have been added to the list of users of germfree animals. One pilot study with the Laboratory of Metabolism, NHI, has been started in the germfree quarters of Building 14G. The Arthritis and Rheumatism Branch of the National Institute of Arthritis and Metabolic Diseases is taking as many germfree animals as it is possible to issue to them.

The success in maintaining the germfree status for production is reflected in the number of animals sent to the laboratories. Our monitoring procedures have included serological tests for eight mouse viruses. All tests have been negative, except for equivocal results with Reo III virus.

An article by Pollard in the Proceedings of the Society for Experimental Biology and Medicine, Vol. 116, pp. 967-971, 1964, reports a radiation-induced leukemia present in all the germfree animals tested at the University of Notre Dame. The germfree colonies at NIH were started from Notre Dame germfree stock.

D. Problems

No significant problems at this time.

E. Program Plans

It is anticipated that LAB will approach its top production of germfree animal potential during the next year.

Production of Pathogen-Free Rodents

A. Objectives

To furnish NIH investigators with laboratory rodents free of microorganisms that are pathogenic or interfere with the execution of experiments and interpretation of experimental data. To develop management and operational techniques applicable to future NIH Animal Center operations.

B. Current Programs

Rats and mice are provided through the breeding of cesarean-derived animals within a barrier system. Current methods of producing pathogen-free animals are critically appraised for their suitability in future operations at NIHAC.

C. Program Progress and Accomplishments

At the start of FY 1965, the program for producing pathogen-free animals was limited to one room in which animals were produced in plastic isolators. During the year, breeders from these isolators were used to establish mouse production and to start rat production in the regular pathogen-free animal rooms. At the current rate, production would be 15,000 animals per year. Bacteriological and parasitological monitoring has shown these animals to be of higher quality than originally anticipated.

D. Problems

Although problems have occurred that delayed initiation of the pathogen-free program, these are being corrected within the Division. The program itself is not yet in full enough operation to have brought to light any problems of a production nature.

E. Program Plans

It is planned that the production of pathogen-free mice and rats will be significantly increased. Production costs will be reimbursed by sale of animals through the Revolving Fund. Pilot production of guinea pigs is anticipated during the next year.

Production techniques and the design of the facilities will continue under test and evaluation. As findings are developed they will be utilized for increasing production efficiency and for future planning purposes.

Maintenance of a Special Flock to Produce RIF-free Eggs

A. Objectives

To furnish NIH investigators fertile hens' eggs free of the Resistance Inducing Factor (RIF) and to develop a coordinated long-range program for production of RIF-free eggs.

B. Current Programs

Eggs are being produced by maintaining a flock of chickens within a barrier system. The birds are housed in individual cages, bred by artificial insemination, and regularly monitored for RIF.

C. Program Progress and Accomplishments

The old RIF-free flock at the NIH Animal Center became contaminated late last year and was discontinued. A replacement flock of birds has been hatched, reared, and brought into full production status utilizing Building 14G facilities in Bethesda. Productivity and fertility of this flock is excellent.

Since the present flock is too small to meet overall NIH needs and occupies space needed for the production of pathogen-free rodents, an improved long-range plan has been developed for the supply of RIF-free eggs to NIH laboratories. This plan has been forwarded through channels for approval; a program of requirements for the necessary buildings has been developed.

D. Problems

Laboratory tests for the detection of RIF require long periods of time to complete, are difficult to control, and are often difficult to interpret. These tests are performed in DBS and NIAID laboratories. Recent test results gave an indication of possible RIF contamination in our flock; however, follow up tests cannot be conclusively interpreted as proving or disproving the RIF contamination. The uncertain RIF status of the flock makes planning for its continuation and development difficult.

E. Program Plans

Considerable effort will be exerted in implementing the new long-range plan for supply of RIF-free eggs. This plan calls for a top security nucleus flock housed in isolators, plus a production flock in two poultry houses using the barrier concept to prevent contamination, and supply of additional eggs by a commercial contractor.

The present flock will be continued unless it is contaminated. If contaminated, it will be cleaned up or replaced.

Quarantined and Conditioned Animals

A. Objective

To furnish quarantined and conditioned dogs, cats, primates, and feral and farm animals to NIH investigators.

B. Current Programs

The system of initial and quarterly inspections of dog and cat vendor establishments is designed to upgrade procurement standards. Efforts are made to select from the animals entering the quarantine programs those which are particularly suitable for certain investigators' needs.

Programs of disease detection, treatment, and control will be discussed under Animal Health.

The active program of designing dog, cat, and primate caging will be reported under Research and Development.

The dog and cat breeding programs were reinstituted. The primate breeding program was continued.

C. Program Progress and Accomplishments

Quarantined dog issues will be approximately the same as FY 1964 or 4,600 animals. However, quarantined cats are expected to be 25% higher in FY 1965 with nearly 2,500 animals being issued to investigators. Issues of monkeys from the Primate Quarantine Unit dropped from 3,700 in FY 1964 to an estimated 2,800 for FY 1965. The decrease is due to the disease problem described in Animal Health.

During this period, LAB has developed new commercial sources of dogs and cats and by means of regular and standardized inspections has encouraged vendors to improve their facilities and handling practices. This expenditure of professional effort has served to safeguard NIH's public image. The newly instituted program to quarantine feral animals closed a gap in the NIH rabies control program. In one instance this new program served to prevent the entry of a tuberculous opossum into a laboratory.

The dog and cat breeding programs have been expanded to the limit of their available resources in order to produce dogs for special purposes, furnish experience to LAB personnel, and maintain a nucleus for possible expansion. The breeding program of the Primate Quarantine Unit has produced a limited number of progeny that have been eagerly received by investigators.

Close cooperation with the National Heart Institute and careful utilization of space and facilities in LAB permitted surgical research on dogs to continue during a difficult period of alterations in

Building 3. At the same time, NHI investigators were able to continue a surgical project in bovines, despite increased demands for critically needed animal holding space.

The selection of suitable cats from the quarantine program increased the heterochromic-eyed colony of NIDR, and, since there is a genetic linkage, this colony will provide for future research in hereditary deafness.

D. Problems

The major problems during this period have been personnel vacancies and the lack of space. Personnel shortages have been felt most acutely in the dog long-term holding and cat quarantine programs. LAB has had to request that investigators minimize the number of dogs used and the length of time they are held in the facilities of Building 28. The cat quarantine unit has not been able to supply all the cats requested because of the limited space in Building 14D. This latter problem should be relieved when the program moves to NIHAC.

E. Program Plans

The completed move into Phase I buildings at NIHAC will permit LAB to meet Institute demands for dogs, cats, and farm animal services. The bovine heart surgery project of NHI and the increased demand for quarantined cats by several Institutes are high on the list of newly developing programs.

Negotiations with Federal Prison Industries, Inc., regarding dog breeding will continue, and plans for implementation will be made if and when NIH approval is forthcoming.

Animal Health

A. Objective

To characterize and improve the health status of the laboratory animals produced and quarantined by the NIH animal colonies for use in the medical research programs of the NIH.

To study the causes of naturally occurring laboratory animal diseases and to implement methods of therapy, prevention, and control.

B. Current Programs

The problem of disease control in closed colonies of rodents and rabbits is met through a multi-disciplined approach to monitoring. Comparative Pathology Section pathologists and microbiologists work closely with the Animal Production Section to control and eliminate infectious disease.

The Section also provides laboratory diagnostic service in conjunction with the disease control programs of the Dog and Cat, Primate Quarantine, and Farm Animal Units and provides bacteriologic monitoring service for the Pathogen-free Unit.

Routine control of infectious diseases of primates is approached through a program of tuberculin testing, bacteriologic monitoring, and treatment of clinically affected animals with drugs and antibiotics. Control of infectious diseases of dogs and cats is carried out through a program of routine immunization and by treatment of clinically affected animals with drugs and antibiotics. Health of farm animals is maintained through a program of preventive medicine and routine testing.

In addition to programs for controlling infectious diseases, there are studies conducted on nutritional and metabolic diseases. Working in conjunction with the NIH Animal Nutrition Committee, LAB designs and conducts feed trials to determine the value of new rations.

To support health surveillance of colony animals, there is a program to study, under controlled conditions, naturally occurring diseases of laboratory rodents and rabbits.

C. Program Progress and Accomplishments

The *Bordetella bronchiseptica* vaccine which was prepared and put into use in the Strain 13 guinea pig colony in FY 1964 has continued to be highly effective in the prevention of pneumonia. No adverse affects of the vaccine have been detected, and no cases of pneumonia have been diagnosed since the vaccination program was initiated. The results add further support to the evidence indicating that the long-studied enzootic and epizootic pneumonias of guinea pigs are caused by *Bordetella bronchiseptica*. Requests for the vaccine from laboratories outside of the NIH have been answered by supplying the method of its preparation.

Tuberculin testing of rhesus monkeys has disclosed a tuberculin sensitivity rate of 2.1%. This rate falls immediately between the 2.5% incidence during 1962 and 1.7% incidence during 1963-64. Seven of 50 Patas monkeys became tuberculin positive during their quarantine period.

The use of non-domestic animals such as opossums, genets, iguanas, and reptiles, by certain NIH investigators has presented additional problems in nutrition and disease control. The occurrence of tuberculosis in one of the opossums has made it necessary to develop a tuberculin testing procedure for these animals. Although it seems likely that a scavenger animal would have high exposure probability to tuberculosis, a preliminary search of the literature has failed to reveal reports of the disease in the opossum.

A febrile hemorrhagic disease of monkeys, not previously recognized in the NIH primate colony, occurred in epizootic proportions during November and December of 1964. Pathology, clinical pathology, epidemiology microbiology, and clinical medicine findings indicated that the highly fatal disease was caused by an infectious viral agent of low contageousness and revealed that the disease manifestations were similar to those of several Asiatic hemorrhagic fevers of man. Following the application of physical control methods, including strict colony quarantine and animal isolation, the disease diminished in incidence and disappeared finally in January 1965. Because of the suspected hazard involved in working with the agent, the responsibility for virologic workup was extended to a laboratory with closed systems for virus isolation.

The causative agent of Tyzzer's Disease of Rabbits was isolated in pure culture in embryonated hen's eggs. The agent is the only known obligate, intracellular organism that produces spores. It possesses characteristics of both rickettsia and bacteria. Studies are in progress to fully characterize the agent and to determine with fluorescent-antibody methods if it has antigens in common with the agent of Tyzzer's disease of the mouse. Tyzzer's disease is again occurring enzootically in the rabbit colony. Personal communications from investigators in England indicate that the agent from the mouse, which has been studied since 1917, also has been isolated for the first time.

Enteritis is still a major problem among newly arrived primates, and approximately 15% of incoming rhesus monkeys are carrying one or more of several serotypes of Shigella spp. Avirulent hybrid strains of these organisms have been found to offer protection against the virulent organism and are being studied for the purpose of vaccine development.

Several years of efforts finally resulted in the isolation of the intestinal bacterium that is consistently found in association with mucoid enteritis of rabbits. The agent has not been described previously in the literature. It has been lyophilized and stored for more complete characterization and pathogenesis studies when time permits. A similar agent previously isolated from the intestines of mice was found to be highly pathogenic for rabbits when inoculated intravenously, causing progressive total necrosis of the liver and death in 40 to 45 days. The true significance of these agents in the animal colonies is yet unknown.

Using an emulsified univalent bacterial antigen, vaccine studies on chronic murine pneumonia were carried out in the general purpose rat colony. The vaccine failed to prevent the disease syndrome. Transmission studies of three or more suspect etiologic agents are in progress using germfree rats in plastic isolators.

In studies of the respiratory disease complex of quarantine dogs, the serum-vaccine method of vaccination was found to be of prophylactic value. The mortality rate was 8% in the vaccinated group and 14% in the unvaccinated controls. Studies to determine the prophylactic value of commercial hyperimmune serum, canine antibody concentrate, and modified live virus distemper-hepatitis vaccine are in progress.

D. Problems

The Comparative Pathology Section has been unable to fill its position of veterinary pathologist. One veterinarian, who was completing his graduate training in pathology and for two years expected to join the Section in July 1965, has instead taken a position with one of the Institutes as a Section Chief. Five persons contacted regarding the position have turned it down, all indicating that the salary was too low. An investigation of the salary problem indicates that it may be very difficult to hire trained veterinary pathologists in the future. Chief competition in hiring is coming from universitites and industry.

E. Program Plans

Ongoing programs outlined above will continue.

It is anticipated that with the completion of Building 28A renovations, a more intensive effort can be made to study chronic murine pneumonia, Tyzzer's disease, and mucoid enteritis of rabbits.

A clinical pathology laboratory will be operated at the NIH Animal Center to support animal programs at that installation.

Research and Development (Collaborative Program)

A. Objectives

To conduct research that will supply basic information needed for the effective planning of the NIH Animal Center.

To conduct a research and development program designed for improving animal facilities, caging, and automated feeding, watering, and sanitary systems. To investigate environmental factors influencing animal production. Both of these objectives are part of the overall mission to provide NIH investigators with the best animals possible.

B. Current Programs

Developmental projects are underway which will produce cage systems designs to be implemented in Phases IA and II of NIHAC and to support the developmental program in the Pathogen-free Unit.

Materials testing projects are underway which will determine the most suitable animal care equipment commercially available for LAB and the Institutes. Part of this program is in collaboration with Supply Management Branch.

A study of environmental effects of animal rooms is being conducted.

C. Program Progress and Accomplishments

The FY 1965 was devoted primarily to the development of caging systems for Phase I, IA, and II of the NIH Animal Center.

Late in the year, development was begun on a new type of primate cage which will save a significant amount on the initial purchase cost and provide more flexible and comfortable housing for the primates. Prototypes were designed and constructed and evaluation should be complete early in FY 1966.

A suspended rat-breeding cage system that features automatic watering and automatic cage cleaning has been developed. The evaluation of the prototypes and the completion of design plans will be completed in early FY 1966 for inclusion in the Phase II building development.

A joint program with Toledo Scale Company resulted in the development of a rodent classifier that automatically weighs and sorts mice to an accuracy of one-half gram.

During the period covered by this report, a comprehensive study was made of the NIH caster specification for animal cages. The problem with this specification was the lack of availability for small quantities and the high cost of the units when available. Several caster manufacturers were consulted and invited to submit standard items for comparative tests. The caster built to NIH specifications proved to be among the least desirable. A new specification, which will provide a better caster at less cost than the previous model, is now being written.

During the year a relationship was established with Purdue University, and tentative plans were made for a collaborative effort between the Research and Development Team and the Purdue Animal Husbandry Department for the testing of hydroponically produced grass for laboratory rodents. Certain of the species require green roughage as a supplement to their pelleted diet; this is currently met through the use of kale and other green vegetables. However, when the entire operation becomes pathogen-free, it will be impossible to sterilize common garden vegetables. There is hope that hydroponically produced grass in a closed system can be successfully conveyed and fed to rodents to meet this need.

A photoperiodism study is underway as part of the environmental program. This is reported as an Individual Project Report.

D. Problems

No problems.

E. Program Plans

During the coming year the Research and Development Team will coordinate with RFPB the development of plans for the NIH Animal Center and will continue to develop equipment and systems to be utilized at NIHAC.

The Team will also coordinate very closely with the production and genetics units in the development of transition and logistic support plans for the move to NIHAC.

A prototype rabbit facility, which will permit the production of healthier animals at a significantly lower cost than current methods, will also be developed at NIHAC. An existent structure will be slightly modified to permit an evaluation of the production method in a climate of this geographical area.

Media Production

A. Objective

To produce and issue the highest quality bacteriological and tissue culture media. To furnish consultative services to the Institutes on related problems.

B. Current Programs

Media production is geared to meeting Institute needs as to quantity and type of media. To fulfill its mission, the Media Unit employs automated equipment wherever possible and makes use of a cross-reference system of record keeping.

The quality control program of media production was expanded this year to include plating efficiency testing of the major tissue culture media concentrates. The unit has continued to provide concurrent testing of its media by using several established tissue culture cell lines.

The Media Unit assists in the development of improved methods for procuring and storing blood, serum, tissues, etc., from animal sources. The Unit also tests and processes these materials for issue or incorporation into media or tissue culture.

C. Program Progress and Accomplishments

Based on the first nine months of FY 1965, the projected number of requisitions processed will total approximately 12,000. This is indicative of a leveling off for the present, since the last report also showed a monthly average of 1,000 requisitions processed.

In terms of volume of media produced, the projected figures indicate 41,000 liters of bacteriologic media and 36,000 liters of tissue culture media for a total of 77,000 liters in FY 1965.

As a by-product of the expanded quality control program, several additional cell lines were added to the frozen cell bank maintained in the Unit. These cells, such as the human diploid line, WI-38, are now maintained under liquid nitrogen temperatures instead of solid CO_2 storage. This has resulted in increased viability of the stored cells when removed from the cell bank for use.

As previously predicted, the demand for tissue culture cells of various types has increased among the investigators using these excess cells. The Unit has been able to increase the number of tubes of cells produced on a weekly basis to a projected total of 87,000 tubes over and above the requirements for quality control. All reports indicate satisfaction with the quality of the cells received.

Working closely with the Farm Animal Unit, the Media Unit has succeeded in improving the sterility rate of sheep blood acquired from the NIH Animal Center. Parallel efforts have effected similar results when problems developed last year with rabbit blood obtained from commercial sources. The DRS-sponsored space utilization study completed early in the year and the subsequent recommendations were accepted by all concerned. It is expected that the proposed renovations will be underway before the end of this fiscal year. Hopefully, these completed renovations will provide adequate sterile production areas, resulting in increased quality of both tissued culture media and heat labile bacteriologic media.

D. Problems

The lack of adequate containers vital to media production continues to be a problem. These containers, such as metal section baskets for dispensing, sterilization, and delivery of tubed media, and large metal trays for transport of large flasks of media, are always in short supply. Without a steady flow of these containers, it is impossible for the Unit to meet the demands of the investigators or to guarantee the condition of the media by the time it reaches the laboratory.

During the year the Media Unit reached its capacity within the limits of its present space and personnel. This was evidenced by the number of complaints received when the Unit was unable to work the necessary overtime required to keep up with the investigators' demands. As mentioned above, the proposed renovations should help to relieve part of the space problem, but unless the renovated areas are properly staffed, the lag time in filling requests for media will continue to increase.

E. Program Plans

Media production will increase within the limits of the space provided and the staff which can work efficiently in this space. Efforts to maintain high quality will not be compromised to meet volume demands. NIH needs that are above our capacity to furnish will have to be met through the use of other sources.

Cost and feasibility studies are planned with respect to purchasing such items as prepared, ready-to-use blood agar plates in disposable plastic petri dishes for reissue to the investigators through the Media Unit. This would allow a reduction in the lag time for requests for these and other related items.

Additional studies are planned on the use of powdered, dehydrated complete tissue culture media prepared either commercially or within the Media Unit. Increased interest in and use of this type of material is expected among the NIH investigators.

Glassware Preparation

A. Objectives

To furnish clean glassware of the highest quality by processing through the steps of decontamination, sorting, cleaning, wrapping, sterilization, and issue. This overall operation includes processing of used glassware from the investigators and the introduction of new glassware from adequately maintained replacement stock.

To furnish consultative services on problems associated with laboratory glassware.

To furnish cagewashing service to the Clinical Center, Auburn Building, and Patuxent River Laboratory.

B. Current Programs

In addition to filling Institute demands for the volume and types of glassware, the Unit evaluates management and technical methods and equipment for improving the quality and maintaining the volume of issued glassware.

The cagewashing unit furnishes the services cited under A above and studies problems associated with corrosion, scaling, etc.

C. Program Progress and Accomplishments

Glassware issues to contributing Institutes, projected through the end of the fiscal year, will total almost 6,500,000 pieces. In addition, the Institutes or Divisions that do not contribute to the replenishment fund at present will receive another 600,000 pieces of glassware for a total of over 7,000,000 pieces of glassware issued, an increase of 5% over FY 1964.

The Glassware Preparation Unit has continued to maintain close contact with the investigators and to work in close cooperation with them to resolve temporary problems regarding quality or quantity of glassware issued.

Installation of the two new pipette washers is expected to be completed before the end of the fiscal year. These machines should increase the daily output by over 1,000 pipettes per machine. Since a rinse cycle is built into these machines, chemically clean pipettes can be turned out with much greater efficiency.

A new deionizer, with three times the capacity of either of the present units, is due to be installed by May 1965. This new unit should greatly decrease the workload on personnel responsible for regeneration of the deionizers.

The demand for gas sterilization requiring the large unit has decreased slightly this year, while demands on the smaller unit have continued at the same pace.

Complete conversion to the use of disposable glass culture tubes was accomplished this year. All of the expected advantages of this changeover have been realized after almost a full year of experience handling these tubes. There was only one instance of a critical shortage in one size tube due to a change in packaging on the part of the manufacturer and a mix-up in the inventory records of Stock Control. Steps have been taken to prevent a recurrence of this situation.

A projected total of some 365,000 cages, racks, and associated pieces of equipment will be processed this year. Several minor problems arose during the year involving transportation of cages and racks to the Auburn Building and the Patuxent River Laboratory, but these have since been resolved. The unit has been asked to furnish this service to another off-campus laboratory of the National Institute of Child Health and Human Development.

D. Problems

In the Glassware Unit, as well as in the Media Unit, the shortage of containers vital to production continues to be a problem. The lack of adequate numbers of sterilization and storage baskets is the most critical need at this time. Metal trays for return of dirty glassware are still a problem. The unit placed over 500 of these trays in circulation during the year, but these were rapidly absorbed.

The processing of special items of glassware also continues to be a major problem. The inability to keep up with increased demands for this type of service was the biggest single source of investigator complaints this year.

E. Program Plans

The Glassware Unit expects to expand the testing of new types of break resistant pipettes in cooperation with the Quality Control Section, Supply Management Branch. At least two manufacturers have submitted samples of their pipettes through Quality Control for usage tests.

Further study on the project to automate the pipette wrapping operation is expected to continue. Some slight progress has been made, but much remains to be done to increase the efficiency of this operation.

Special and Consultive Services to the Institutes

A. Objectives

To furnish special services pertaining to animals as required by the Institutes. These services include providing animal X-ray and surgery, holding animals after surgery for indefinite periods, consulting on animal health and related fields, recommending proper colony management practices, and planning of animal facilities to comply with accepted standards and to meet the needs for the projected use of the building.

B. Current Programs

The LAB veterinarians and other specialists furnish NIH investigators with a variety of information on normal animal anatomy and physiology, proper husbandry practices, and disease problems.

A staff of specialists offers animal X-ray and surgical services to the extent that available resources permit in Building 28. These facilities are supported by an intensive care team and long-term holding facilities.

LAB staff members are active in the design of animal facilities to be utilized for their programs, such as the NIH Animal Center, and are consulted by the Institutes on design of animal facilities.

Because of LAB's special facilities and personnel, exotic species are accommodated that would otherwise have to be held by the Institutes.

LAB has provided the space and caretaking service for a limited number of radioactive isotope experiments.

C. Program Progress and Accomplishments

The planning and design of new facilities at NIHAC continues, based on the experiences gained from Buildings 14, 28, and the temporary and permanent structures at NIHAC.

Among the exotic species held by special requests have been Virginia Whitetail deer, African genets, and Mexican iguanas.

Because suitable space on the reservation was not otherwise available, LAB provided space, supervision, and caretaking service for several radioactive isotope experiments. The care exercised permitted the experiments to be accomplished with minimal hazard.

Studies performed in collaboration with the Laboratory of Cardiovascular Physiology, NHI, showed that cervical vagotomy in dogs decreased urine flow independently of changes in glomerular filtration rate, sodium and potassium excretion, and osmolal clearance.

The Branch served as technical advisor for a motion picture film, "Safe Handling of Laboratory Animals," produced in cooperation with Plant Safety Branch. A camera crew from the Communicable Disease Center spent several days in LAB facilities shooting film for the movie. As technical advisors, personnel in the Branch assisted with the script and in scenes. Editing was done by NIH personnel at CDC. The film has been completed and arrangements for loan may be made through the PHS Audio-Visual Facility at CDC, Atlanta, Georgia.

D. Problems

A major problem in special services is lack of adequate facilities to conduct radioactive isotope experiments.

LAB animal surgical facilities are no longer considered adequate to meet all NIH program needs. The more sophisticated surgical procedures now used on animals require specialized equipment and facilities. Either LAB must supply these facilities or services or the Institutes will turn to establishing and operating their own.

E. Program Plans

The programs will continue as outlined above but will be modified in response to demands by the Institute for specific services.

Efforts will continue in the design of special purpose buildings as requested, e.g. a radioactive isotope utilization building and a surgical suite appendix to Building 28. Planning for the NIH Animal Center will continue.

PUBLICATIONS AND PATENTS

Publications

Allen, A. M., Ganaway, J. R., Moore, T. D., and Kinard, R.F.: Tyzzer's disease syndrome in laboratory rabbits. Amer. J. Path. 46: 859-882, May 1965.

Byrne, R. J.: NIH Animal Center. Maryland Veterinarian. 6: 8-9, May 1964.

Palmer, A. E.: Restraint of monkeys. Maryland Veterinarian. 7: 4-8, April 1965

Presentations

Byrne, R. J.: Clinical, Laboratory, and Epidemiological Aspects of Arthopod-borne Virus Encephalitis of Horses. New Jersey State Veterinary Association, March 1965.

Serial No. 4.1
1. Laboratory Aids Branch
2. Animal Production Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: EFFECT OF VARIOUS DAY-LENGTHS ON THE PRODUCTIVITY OF MICE

Principal Investigator: Cobert D. LeMunyan, Ed.D.

Other Investigators: William R. Clark, Jr., RFPB

Cooperating Unit: Research Facilities and Planning Branch

Man Years (computed for the 12-month period)

Total:	1.1 (APS only)
Professional:	.1
Other:	1.0

Project Description:

Objective: Animal breeders have long believed that reproductive cycles in rodents are influenced significantly by the length of daylight. The very small amount of experimental work which has been done in this field has not concerned itself with laboratory rodents. However, the empirical evidence is strong enough to justify a controlled experiment to determine whether the length of day(light) has any influence over the reproductive performance of breeding mice.

Methods Employed: Six cubicles were constructed within a room, each capable of housing fifty pairs of breeding mice. Each cubicle has individual temperature and lighting control. For the purposes of this experiment, the temperature and relative humidity will be held constant. The length of day is the variable factor; a number of cubicles will be set at different day lengths and one control cubicle will follow the natural lighting cycle. For this phase of the project, light intensity will be held constant by a fluorescent source.

Major Findings: The pilot phase for testing and evaluation of equipment, methods, and animal heat loads prior to the actual experimental run was concluded in August 1964. The equipment was checked out, defective materials and equipment were replaced, and the caretaker technician

Part A (Cont'd)

was trained for the final experimental course. The actual experimental run started in late August 1964 and will be concluded in August 1965.

Significance:	The findings of this research will be utilized in the planning of the rodent and rabbit buildings at the NIH Animal Center in Poolesville, Maryland.

Proposed Course of Project: The study of day-length will take one year to complete all phases of the lighting cycle. Following this, it is proposed that light intensities and sources be studied and the findings be incorporated in the design of the buildings at the NIH Animal Center.

Part B included Yes_____ No__X__

Serial No. 4.2
1. Laboratory Aids Branch
2. Germfree Animal Production Unit
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: ESTABLISHING AND PRODUCING GERMFREE HAMSTERS

Principal Investigators: Carl E. Miller, D.V.M.
D. B. Fitzgerald, B.S., NIDR

Other Investigators: Howard J. Bohner, B.A.
R. J. Fitzgerald, Ph.D., NIDR

Cooperating Units: Animal Production Section, LAB
Gnotobiotic Section, LM, NIDR

Man Years (computed for the 12-month period)

Total:	.2 (GAPU only)
Professional:	.1
Other:	.1

Project Description:

Objective: To establish hamsters in the germfree environment and maintain them by production in the germfree isolators.

Methods Employed: A cesarean delivery of the infants is performed, followed by an attempt to raise them either by hand feeding or by foster nursing on germfree mothers of other species.

Major Findings: The very small size and immaturity of the infant hamster (16-day gestation period) makes replacing its mother very difficult. A method of obtaining hamster milk and sterilizing it without heat has been developed. A chemical analysis of the milk has been obtained through a contract with the University of Minnesota. One newborn hamster was raised outside of an isolator, but this has not been accomplished inside the isolator as yet.

Significance: The National Institute of Dental Research considers the germfree hamster the single most important animal for their program. The importance of hamsters in other research has increased a great

Part A (Cont'd)

deal with reports of the hamsters' susceptibility to adenoviruses and that SV-40 produces tumors in their cheek pouches. The germ-free hamster will eliminate any complicating infections in this type of experimental work.

Proposed Course of Project:	Continuation.

Part B included Yes____ No X

Serial No. 4.3
1. Laboratory Aids Branch
2. Animal Hospital Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: BREEDING OF THE STUMP-TAILED MACAQUE MONKEY (*MACACA SPECIOSA*) IN CAPTIVITY

Principal Investigator: Amos E. Palmer, D.V.M.

Other Investigators: Ruth Kirschstein, M.D., LP, DBS
William Tullner, Ph.D., EB, NCI

Cooperating Units: Laboratory of Pathology, DBS
Endocrinology Branch, NCI

Man Years (computed for the 12-month period)

Total:	.4	(AHS only)
Professional:	.2	
Other:	.2	

Project Description:

Objective: To attempt to evaluate the reproductive potential of the *M. speciosa* in captivity. To supply infant *M. speciosa* to research laboratories. To introduce a monkey species into NIH laboratories which is more easily handled than present, commonly held species (*M. mulatta*).

Methods Employed: Menstrual cycles will be determined and matings attempted at the expected time of ovulation. Pregnancies will be ascertained by either gonadatropin studies or digital palpation. Births will be recorded and the infants used in research.

Major Findings: Menstruation, as seen in other macaque monkeys is not detectable in the *M. speciosa* presently under study. By mating over prolonged periods, without good guidelines to estimate time of ovulation, we thus far have successfully bred six females. Serum gonadotropins are detectable with parameters similar to the rhesus monkey. To date there has been two live births, two pre-term abortions and one still birth (delivered by cesarean).

Part A (Cont'd)

Significance: Research laboratories must have primates at or soon after birth in order to carry out studies on some evasive agents. Animals of this nature are not available by commercial suppliers, thus it is imperative that primates be bred for research needs in captivity. Because of its nature the *M. speciosa* is a more desirable animal for such a program than the *M. mulatta* presently in use.

Proposed Course of Project: Continuation.

Part B included Yes____ No X

Serial No. 4.4
1. Laboratory Aids Branch
2. Animal Hospital Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: EVALUATION OF PROGRAMS FOR IMMUNIZATION OF QUARANTINE DOGS

Principal Investigator: Francis J. Judge, D.V.M.

Other Investigators: None

Cooperating Units: None

Man Years (computed for the 12-month period)

Total:	.45
Professional:	.05
Other:	.4

Project Description:

Objective: To determine if the current program of immunization is of value in a prophylactic program for the respiratory disease complex of quarantine dogs.

Methods Employed: Series I: This project compared three groups of dogs on controlled procedures to a group receiving the standard sequence of vaccinations. Each group contained 250 dogs. Group I (Standard) received antiserum at entry and was vaccinated in two weeks. Group II (Serum Control) received serum only at entry. Group III (Vaccine Control) received only vaccine two weeks after entry. Group IV received neither serum nor vaccine.

Series II: Four groups of 250 dogs each were again used. The first three groups were placed on different immunization programs, and the fourth group served as an unvaccinated control. Group I received vaccine at entry but no serum. Group II received antiserum at the time of entry and was vaccinated two weeks after entry. Group III was inoculated with canine globulin concentrate; each dog was then vaccinated two weeks after entry.

Programs in both series are evaluated by the morbidity and mortality in each group, as well as the number of returns to the vendor after one week in each group.

Part A (Cont'd)

Major Findings: Series I: The percentage of returns to the vendor after one week and the morbidity figures were relatively constant in all groups. However, in Group IV, which received no immunization, morbidity and returns were highest.

The mortality figures showed the greatest variation between groups, and ranged from 4.4% for Group II to 13.6% for Group IV. Group I had a mortality rate of 7.6% and Group III of 10.8%. It must be concluded that the use of serum does decrease the mortality rate during the 30-day quarantine of dogs.

Series II: Results are not yet tabulated.

Significance: The above and planned studies are being performed in an effort to determine a method of prophylaxis, which will significantly reduce the mortality and morbidity losses due to the respiratory disease complex in quarantine dogs. Immune serum may help in reducing mortality.

At present the morbidity rate in these dogs ranges from 50 to 70% and no method of immunization tried has significantly lowered this rate.

Proposed Course of Project: Further studies to evaluate the different products available for distemper immunization are planned so that the most suitable immunization program for quarantined dogs may be developed.

Part B included Yes____ No__X__

Serial No. 4.5
1. Laboratory Aids Branch
2. Animal Hospital Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: EVALUATION OF SHIGELLA FLEXNERI ATTENUATED VACCINE

Principal Investigator: Samuel B. Formal, Ph.D., WRAIR

Other Investigators: Amos E. Palmer, D.V.M.

Cooperating Units: Laboratory of Immunology, WRAIR

Man Years (computed for the 12-month period)
Total: .45 (AHS only)
Professional: .25
Other: .2

Project Description:

Objective: To attempt to develop and evaluate an attenuated, non-pathogenic form of Shigella flexneri (of several serotypes) for potential use as an immunogenic agent to protect rhesus monkeys against these organisms while under quarantine.

Methods Employed: Hybrid organisms produced by mating Shigella spp. with E. coli will be given, via the oral route by stomach tube. Animals will be challenged with fully virulent organisms at varying intervals to determine susceptibility to the virulent agents. In later studies, 50% of the newly arriving rhesus monkeys will be treated, followed by close observation for differences in incidence of shigellosis between treated animals and untreated controls.

Major Findings: One dose of the hybrid organisms given orally affords protection to challenges with virulent organisms of the same serotype.

Significance: About 15% of the rhesus monkeys imported into the Primate Quarantine Unit shed Shigella flexneri organisms of several serotypes. The clinical syndrome accredited to Shigella spp. is an acute, bloody diarrhea which costs more in treatment, loss of condition, and deaths than any other disease encountered in primates. An immunizing agent

Part A (Cont'd)

of this nature would greatly decrease problems in conditioning primates and increase the quality of animals issued by the Primate Quarantine Unit.

Proposed Course of Project:	Continuation of studies to evaluate the value of such vaccines in the quarantine of primates. A manuscript has been submitted for publication.

Part B included Yes____ No__X__

Serial No. 4.6
1. Laboratory Aids Branch
2. Animal Hospital Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: AN EPIZOOTIC OF MEASLES IN A COLONY OF RHESUS MONKEYS (*MACACA MULATTA*)

Principal Investigator: Stephen Potkay, V.M.D.

Other Investigators: James R. Ganaway, D.V.M., M.P.H., CPS
Roy Kinard, D.V.M., CPS
Nancy G. Rogers, B.S., LVI, DBS

Cooperating Units: Primate Quarantine Unit, AHS
Comparative Pathology Section, LAB
General Virology Section, LVI, DBS

Man Years (computed for the 12-month period)
Total: Less than .08 (AHS only)

Project Description:

Objective: To determine the etiology of a condition in the rhesus monkeys of the Primate Quarantine Unit, which interfered with tuberculosis test readings.

Methods Employed: Monkeys were examined daily and clinical findings were recorded. Blood samples were collected and examined for measles antibody titer.

Major Findings: Serology showed that the disease was measles (rubella) and clinical observations were those of conjunctivitis, maculopapular skin rash, and varying degrees of facial edema and erythema. The clinical feature of the natural occurrence of this disease have not been reported previo

Significance: This project has provided a quick method of determining the presence of measles in the primate colony.

Proposed Course of Project: Completed. A manuscript has been submitted for publication.

Part B included Yes_____ No X

Serial No. 4.7
1. Laboratory Aids Branch
2. Animal Hospital Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: CLINICAL ASPECTS OF A FEBRILE HEMORRHAGIC DISEASE OF MONKEYS IN A QUARANTINE COLONY

Principal Investigator: Amos E. Palmer, D.V.M.

Other Investigators: Anton M. Allen, D.V.M., Ph.D., CPS
Stephen Potkay, V.M.D.
James Ganaway, D.V.M., M.P.H., CPS
Ruth Kirschstein, M.D., LP, DBS
Alexis Shelokov, M.D., LVR, DBS

Cooperating Units: Comparative Pathology Section, LAB
Laboratory of Pathology, DBS
Laboratory of Virology and Rickettsiology, DBS

Man Years (computed for the 12-month period)

Total:	1.3 (AHS only)
Professional:	.4
Other:	.9

Project Description:

Objective: To describe and identify the cause of a disease which occurred in epizootic proportions among monkeys held in the Primate Quarantine Unit during November and December 1964.

Methods Employed: Clinical examination, postmortem examination, clinical medicine, and epidemiological studies were employed.

Major Findings: The disease was characterized clinically by fever, anorexia, albuminuria vomition, bloody diarrhea, cutaneous petechial hemorrhages, epistaxis, dehydration, and death in most clinically affected animals. The incubation period in inoculated animals was 48 hours to four days, deaths occurred in six to 14 days.

Incidence per room ranged from 10% to 60%. Wide spectrum antibiotics and supportive therapy were ineffective. Transmission was accomplished by close animal contact and by inoculation

Part A (Cont'd)

with blood, serum, and tissue suspensions from infected animals. Several animals survived clinical infections during the epizootic and after inoculation. The disease was fatal to about 225 monkeys, affecting Macaca mulatta, Macaca irus, and Macaca speciosa.

Significance: The disease is not known to have occurred previously among primates. Since the etiologic agent is not yet identified, the importance of the disease cannot be evaluated at this time. The epizootic stopped the normal function of the Primate Quarantine Unit for three months.

Proposed Course of Project: All work with the disease has been eliminated from the facilities of the Primate Quarantine Unit. Virological studies are continuing in an effort to identify the agent and to further study the pathogenesis of the disease.

Part B included Yes____ No X

Serial No. 4.8
1. Laboratory Aids Branch
2. Comparative Pathology Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: FEBRILE HEMORRHAGIC DISEASE OF MONKEYS

Principal Investigator: Anton M. Allen, D.V.M., Ph.D.

Other Investigators: James R. Ganaway, D.V.M., M.P.H.
Roy Kinard, D.V.M.
Amos E. Palmer, D.V.M.
Nicola Taurasco, M.D., LVR, DBS

Cooperating Units: Animal Hospital Section, LAB
Laboratory of Virology and Rickettsiology, DBS

Man Years (computed for the 12-month period)

Total:	1.6 (CPS only)
Professional:	.6
Other:	1.0

Project Description:

Objective: To study the pathogenesis of the disease and initiate methods of control or elimination.

Methods Employed: Pathology, clinical pathology, microbiology, clinical medicine, and epidemiology methods were employed.

Major Findings: The disease was characterized clinically by fever, albuminuria, variable leukopenia and thrombocytopenia, terminal anemia, and death of most clinically affected animals; pathologically by (1) cutaneous, pulmonary, renal, hepatic, intestinal, and subperitoneal hemorrhage, (2) systemic vascular stasis, (3) glomerulo-nephrosis, (4) follicular necrosis of lymph nodes, thymus, and spleen, (5) splenomegaly due to engorgement of the cords with plasma, (6) variable focal necrosis of the heart and adrenal gland, and liver, (7) fatty degeneration and centralobular cloudy swelling of the liver, (8) bone marrow erythropoetic hypoplasia. The time from exposure to death was 6 to 14 days. Incidence rates per room were 10 to 60%. Broad spectrum antibiotics including chloranphenicol were ineffective. Transmission was accomplished by close animal contact and by inoculation of infected blood, serum, and tissue suspensions. Sub-clinical disease with development of immunity evidently occurred in a few survivors of the epizootic. The disease was fatal to 225 monkeys, affecting *Macaca mulatta*, *Macaca irus*, and *Macaca speciosa*.

Significance: The disease is not known to have occurred previously in the primate colony. The causative agent has not been identified, and therefore the health hazard to man is unknown. The epizootic resulted in the interruption of numerous NIH research programs.

Proposed Course of Project: Continuation of studies to identify the causative agent and refine the details of the pathogenesis of the disease.

Part B included Yes____ No X

Serial No. 4.9
1. Laboratory Aids Branch
2. Comparative Pathology Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: CHRONIC MURINE PNEUMONIA OF THE ALBINO RAT

Principal Investigator: James R. Ganaway, D.V.M., M.P.H.

Other Investigators: Anton M. Allen, D.V.M., Ph.D.

Cooperating Units: Animal Production Section, LAB

Man Years (computed for the 12-month period)
Total: .6 (CPS only)
Professional: .2
Other: .4

Project Description:

Objective: To isolate and characterize the etiologic agents. To perform transmission studies with each suspected agent. To recommend measures for prevention and control of this disease complex under colony conditions.

Methods Employed: Microbiology, immunology, and pathology methods were employed.

Major Findings: Results of studies to date indicate that the etiology is of bacterial nature rather than viral as proposed by other investigators heretofore. Controlled vaccine studies were carried out in the General Purpose rat colony using an emulsified univalent bacterial antigen. The vaccine failed to prevent the disease syndrome. Transmission studies using three of the more probably suspect agents in germfree rats housed in plastic isolators are in progress. Other studies indicate that the etiology of otitis media is separate and distinct from that responsible for the pathological processes observed in the lower respiratory tract.

Part A (Cont'd)

Significance: This disease complex is the greatest cause of morbidity and eventual mortality in rat colonies. Affected rats are unfit for research, particularly when destined for long term or toxicity studies.

Proposed Course of Project: Continuation.

Part B included Yes____ No__X__

Serial No. 4.10
1. Laboratory Aids Branch
2. Comparative Pathology Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: MUCOID ENTERITIS OF RABBITS

Principal Investigator: James R. Ganaway, D.V.M., M.P.H.

Other Investigators: Anton M. Allen, D.V.M., Ph.D.
Thomas D. Moore, Ph.D.

Cooperating Units: Animal Production Section, LAB

Man Years (computed for the 12-month period)

Total:	.6
Professional:	.3
Other:	.3

Project Description:

Objective: To determine the etiological factor(s), and to attempt experimental reproduction of the disease in rabbits. Based on the foregoing, to recommend measures for control or prevention in the rabbit colonies.

Methods Employed: Routine pathological and bacteriological methods were used.

Major Findings: This chronic condition in weanling rabbits smolders endemically in the rabbit colonies. Although sporadic in occurrence, when it does appear, usually the entire litter is affected. The agent suspected as having prime etiological significance, because of its observation in roughly 95% of the cases, has now been isolated in pure culture. Characterization of this agent and carrying out of transmission studies have not been performed due to lack of time and personnel.

A similar but not identical agent of the mouse has been isolated in pure culture. The agents from both the rabbit and the mouse occur in the cecum and proximal colon and have highly characteristic morphology and tinctorial properties. The agent from the mouse is slightly smaller than the one from the rabbit. This agent selectively grows in the cytoplasm of hepatic cells of

Part A (Cont'd)

intravenously inoculated rabbits and results in extensive liver necrosis and death in 40-45 days.

Significance: Mucoid enteritis is the greatest cause of morbidity in our rabbit colonies. Though widely recognized as such throughout the world, etiology has not been ascertained.

Proposed Course of Project: Continuation.

Part B included Yes____ No X

Serial No. 4.11
1. Laboratory Aids Branch
2. Comparative Pathology Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: STUDY OF CAUSES OF DEATH IN STRAIN 13 AND STRAIN 2 INBRED GUINEA PIG COLONIES

Principal Investigator: James R. Ganaway, D.V.M., M.P.H.

Other Investigators: Anton M. Allen, D.V.M., Ph.D.
Roy Kinard, D.B.M.

Cooperating Units: Genetics Unit, Animal Production Section, LAB

Man Years (computed for the 12-month period)
Total: .9 (CPS only)
Professional: .3
Other: .6

Project Description:

Objective: To define the causes of losses in the inbred colonies of guinea pigs. To isolate the etiologic agent(s). To recommend measures for control or prevention of these losses in the colonies.

Methods Employed: Routine microbiology, pathology (both clinical and anatomic), nutritional, and epidemiology methods were used.

Major Findings: Results to date indicate that unidentified dietary deficiencies and Vitamin D toxicity were primarily involved in the rapid deterioration of the colonies. Supplementation of the diet with green leafy plants and reduction in the intake of Vitamin D resulted in complete restoration of the colony.

Significance: Strain 2 and Strain 13 guinea pigs are among the most valuable at NIH and are not available from the outside sources. During 1962-63, the breeding colonies of these animals deteriorated to a point of near extinction as a result of increased incidence of disease.

Part A (Cont'd)

Proposed Course of Project:	Continuation. Several areas of interest derived from this study will be pursued furth
Part B included	Yes_____ No__X__

Serial No. 4.12
1. Laboratory Aids Branch
2. Comparative Pathology Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: FOCAL NECROSIS OF THE LIVER OF RABBITS

Principal Investigator: James R. Ganaway, D.V.M., M.P.H.

Other Investigators: Thomas D. Moore, Ph.D.
Anton M. Allen, D.V.M., Ph.D.

Cooperating Units: Animal Production Section, LAB

Man Years (computed for the 12-month period)
Total: 2.2 (CPS only)
Professional: 1.2
Other: 1.0

Project Description:

Objective: To attempt the isolation, characterization, and identification of the etiologic agent. To study the pathogenesis of the disease. To recommend measures for control or prevention in the rabbit colonies.

Major Findings: This disease has been recognized only at post mortem examination, and is associated with acute enteritis. The lesions in the liver are indistinguishable from those of Tyzzer's disease of mice. The experimental transmission of the disease has been accomplished with healthy rabbits by means of direct contact with infected rabbits and through exposure of healthy rabbits to soiled bedding from contaminated areas. Success in transmitting the disease by parenteral administration of cellular bacillus, which contains a chain of internal bodies histochemically identifiable as carbohydrate, was found to infect four different types of cells, each of which is noted for its capacity to metabolize and store sugars.

The agent, believed to be identical to that observed in lesions of diseased rabbits, has been successfully isolated in pure culture. Now in its thirteenth passage in embryonated hen's eggs, the organism has maintained its typical morphology and staining characteristics. Due to its morphology, it shares many characteristics in common with normal bacteria. Due to its obligate intracellular

Part A (Cont'd)

growth requirement, it resembles members of the order Rickettsiales. Various implications of these factors combined with the lability of the vegetative phase of the organism have caused delay in the successf experimental transmission and reproduction the disease in susceptible rabbits. Studies designed to further characterize the agent are in progress.

Significance:	Essential to our knowledge of laboratory anima diseases. This condition has not been describe heretofore in rabbits.
Proposed Course of Project:	Continuation.

Part B included Yes X No ____

Serial No. 4.13

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part B Honors, Awards, and Publications

Publications other than abstracts from this project:

Allen, A. M., Ganaway, J.R., Moore, T. D., and Kinard, R. F.: Tyzzer's disease syndrome in laboratory rabbits. Amer. J. Path. 46: 859-882, May 1965.

Honors and awards:

None

Serial No. 4.13
1. Laboratory Aids Branch
2. Office of the Chief
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: A STUDY TO DETERMINE THE EPIZOOTIOLOGY OF TYZZER'S DISEASE IN RABBITS

Principal Investigator: Charles W. McPherson, D.V.M., M.P.H.

Other Investigators: Thomas Moore, Ph.D., CPS

Cooperating Units: Comparative Pathology Section, LAB
Animal Production Section, LAB

Man Years (computed for the 12-month period)
Total: Less than .08

Project Description:

Objective: To provide a description of the epizootiology of Tyzzer's disease in rabbits.

Methods Employed: Standard epidemiologic methods of recording and analyzing on cases and controls, such factors as age, sex, ancestory, littermates, previous illness history, parity and litter size; determination of case incidence according to time, place, and environmental changes.

Major Findings: The study is not complete. No attempt has been made to analyze the data.

Significance: Not determined at this time.

Proposed Course of Project: Continuation.

Part B included Yes____ No X

Serial No. 4.14
1. Laboratory Aids Branch
2. Animal Hospital Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: CHRONIC EXTRINSIC CARDIAC DENERVATION BY REGIONAL NEURAL ABLATION

Principal Investigator: Willard M. Daggett, Jr., M.D., LCVP, NHI (now at Massachusetts General Hospital)

Other Investigators: Theodore Cooper, M.D., Ph.D., St. Louis University School of Medicine
Stephen Potkay, V.M.D.

Cooperating Units: Laboratory of Cardiovascular Physiology, NHI
St. Louis University School of Medicine

Man Years (computed for the 12-month period)
Total: Less than .08 (AHS only)

Project Description:

Objective: To describe and demonstrate the pre-operative preparation for the surgical procedure of chronic cardiac denervation, as well as the post-operative care of dogs so denervated. In addition, to discuss the uses of such dogs in research.

Major Findings: Not applicable.

Proposed Course of Project: Completed.

Part B included Yes X No ____

Serial No. 4.14

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part B Honors, Awards, and Publications

Motion Picture:

Chronic Extrinsic Cardiac Denervation by Regional Neural Ablation. A twenty-minute film available from the Office of Information, National Heart Institute, to individuals engaged in research.

Honors and Awards relating to this project:

None

Serial No. 4.15
1. Laboratory Aids Branch
2. Animal Hospital Section
3. Bethesda

PHS-NIH
Individual Project Report
July 1, 1964 through June 30, 1965

Part A

Project Title: DIURETIC MECHANISMS IN THE CHRONIC CARDIAC DENERVATED DOG

Principal Investigator: Joseph P. Gilmore, Ph.D., LCVP, NHI

Other Investigators: W. M. Daggett, Jr., M.D., LCVP, NHI
(now at Massachusetts General Hospital)
Stephen Potkay, V.M.D.

Cooperating Units: Laboratory of Cardiovascular Physiology, NHI

Man Years (computed for the 12-month period)
Total: Less than .08 (AHS only)

Project Description:

Objective: To determine whether urine flow is influenced by vagal afferents other than those associated with the heart.

Methods Employed: Water diuresis was established in the chronic cardiac denervated dog, a preparation in which all extrinsic cardiac nerves are removed. This was followed by bilateral cervical vagotomy. Parameters of renal function used were: glomerular filtration rate osmolal clearance, sodium and potassium excretion, and urine flow.

Major Findings: Cervical vagotomy decreased urine flow independently of changes in GFR, sodium and potassium excretion, and osmolal clearance. The mechanism responsible is probably located within the chest and may be pulmonary in origin, since all cardiac nerves were removed in the preparation used.

Proposed Course of Project: Completed. Data was presented at the 1965 meeting of the Federation of American Societies for Experimental Biology and as an abstract of the proceedings.

Part B included Yes_____ No X

July 1, 1964 through June 30, 1965

PUBLIC HEALTH SERVICE - NATIONAL INSTITUTES OF HEALTH
DIVISION OF RESEARCH SERVICES

Summary of Branch Activities

1. DRS-5
Serial Number

2. Computation and Data Processing Branch

3. H. J. Juenemann
Acting Branch Chief

I. SUMMARY

During the reporting period, the Computation and Data Processing Branch continued to increase the volume and types of computation and data processing services rendered in support of the research and administrative programs of NIH. Among the services and equipment added were analog-to-digital conversion, using SPEDAC, and a Minneapolis-Honeywell-200 computer with paper tape and 1/2" magnetic tape input/output capabilities. A contract was let for a hybrid computer designed to directly support the Clinical Center laboratories in the processing of analog or digital data. A joint NIH/NBS study designed to evaluate and recommend ways of meeting NIH's long-term computing requirements will culminate in the selection of a new computer system, which will be installed in CDPB within the coming fiscal year.

II. BRANCH PROGRAMS

A. Objectives

To provide centralized computation and data processing services, using electronic digital computers, electric accounting machines, oscillogram scanner, plotter and other data processing equipment.

To provide mathematical, statistical, and programming consultation service in support of the research and administrative needs of NIH.

To develop software and problem-oriented computer languages which permit more effective and more efficient use of the resources of the Branch.

B. Current Programs

The Branch is currently providing ADP service for over 250 projects in support of biomedical research and administrative management throughout the various Institutes and Divisions of NIH. These projects fall into six broad categories: mathematical, statistical, epidemological, information retrieval, grants management, and administrative management.

Under the fee-for-service operation, the Branch provided 2.6 million dollars worth of services during the reporting period, an 8% increase over the previous year. However, an 18% increase will be realized in chargeable computer hours. This higher increase in production over cost is made possible through changes in the computer configuration and software, which have improved efficiency and resulted in dollar savings to the customer in the form of reduced rates.

C. Program Progress and Accomplishments

During fiscal year 1965 the Computation and Data Processing Branch acquired a Minneapolis-Honeywell-200 computer to augment its two H-800 computers. This new system replaced much of the peripheral equipment previously required on the H-800 computer.

The Branch, in conjunction with the Laboratory of Clinical Biophysics, has let a contract to acquire a hybrid computing system. The system, to be located in the Clinical Center Building, will consist of a Control Data Corporation 3100 digital computer and a solid state analog computer by Computer Systems Incorporated. These two computers are interfaced to each other through the use of an HL 20. The system will provide NIH scientists with one-step processing and analysis of laboratory data originating in analog form, as well as improved access for the model building phase of experimental work which is dependent on computation or processing of analog or digital laboratory data. It will also provide a sophisticated analog to digital conversion capability for laboratory data which require conversion and editing prior to entry into the large central computers.

Another addition of specialized equipment was the development and installation by the Branch of a limited analog-to-digital converter, SPEDAC. This is a joint project with laboratory scientists in NIAMD and will also serve other Institutes. The equipment enables the researcher to capture physiological or biological data during the course of experiments and to convert that data to digital form for computer processing.

Overcrowding in office areas, machine rooms, and storage facilities was alleviated in September when the Branch acquired approximately 10,000 square feet of renovated office space on the first floor of Building 12. For the first time in two years, all CDPB personnel except those permanently assigned to the Westwood operation were brought together under one roof. The additional space also allowed advanced site preparation for the new computer system to be acquired in FY 1966.

The two EAM Units operated in the Westwood Building for the NIH extramural programs have significantly increased their workload during the year, and machine utilization has been quite good.

In the past year, the Branch developed and inaugurated a telephone request service to enable customers to have stored files edited and various frequency distributions calculated by the H-800 computer. Normally the requested results are produced within 24 hours after the telephone call is received.

Numerous contributions were made to NIH research programs by CDPB during the past year.

For example, the College Faculty Study (COLFACS) was completed for the Office of Program Planning, OD. Data on 13,012 college faculty members required five punched card records per member. Approximately fifty-five frequency and thirty-two percentage distribution tables were generated, using the CDPB developed Table Maker System. The contents of the study reflected a series of variables such as levels of education, assignments, research, and time devoted to activities. Most of these variables were related to the primary teaching field.

A manual was produced by the Branch which facilitates the use of CDPB's statistical program library by researchers who wish to program their own data analyses. Researchers who have the required knowledge of statistics can, by reading the manual, prepare their own input data for certain heavily used computer programs, thus availing themselves of existing programs.

A number of tabulations were made and reports produced for the Perinatal Research Branch. These reports were the results of many studies, which included "Comparison of Gestational Intervals," "Toxoplasmosis Study," "Gestational Age and Type of Delivery," "Apgar Score Comparison Tables," and "Computing Age of Gravida Using Different Terminal Points." These tabulations are run on significant records drawn from a masterfile maintained on nearly 50,000 case studies.

NCI's National Drug Reporting System was developed by the Branch. The system is concerned with the recording of information on drugs being tested for the treatment of cancer in clinical trials throughout the United States. Eventually this system may be tied in with a reporting scheme of the Food and Drug Administration.

A program creating DRG's Research Grants Thesaurus using a Term Reference File was completed. The Thesaurus may now be more easily updated, and these improvements will make possible the printing of the Thesaurus on the NLM's PHOTON printer.

Programming and data processing services were provided for a major data storage and retrieval system of the Pathologic Anatomy Branch of NCI. The system is designed to provide fast retrieval of data on any disease from the Pathological Anatomy Branch's autopsy files, which have been coded and stored on magnetic computer tapes. More than 70 physicians have taken advantage of the service, with an average of 12 search requests submitted per month.

Work was completed on the Dorn Memorial Analysis. This study compared British and Norwegian immigrants to native-born Americans with respect to certain health habits. Tables were produced which present the results for disease variables by age and sex, tabulated specifically for smoking history, residence, and age at migration. Other tables describe the education, occupation, earnings, marital status, and year of migration of the population.

A masterfile of the nearly 70,000 persons in the study will be maintained for future investigations.

Work was performed on a project for NIAMD to compute mineral density in bone segments using analog data or radiograms of the bone segment. The Branch assisted with installation and checkout of a system for capturing and recording analog data for later conversion to digital form using SPEDAC. This involved construction of an interface between the microdensitometer and an FM analog tape recorder and design of an appropriate low pass filter. Computer programming services were also performed for the project.

Thirty-two tables were completed on a Leukemia Study for NCI. This involved tabulating data for each type of leukemia by time intervals for (1) patients treated prior to admission to NIH and (2) those with initial treatment at NIH. Sixteen tables reflected cause of death, tabulated by intervals of death and by year of last follow-up of the patient.

An edit of the 1964 Cancer Card File was performed and frequency tables produced by the Branch for the Cancer End Results Section of the NCI. These frequency tables present counts of cancer occurrences over several variables, including site, sex, race, age at diagnosis, and treatment. Using these counts, preparations can be made for studies dealing with mortality rates of cancer patients.

The data processing phases of the Veterans Administration Study, dealing with the effects of smoking on mortality rates, was completed. As a basis for the study, records obtained from the Veterans Administration were used to classify approximately 300,000 individuals according to their smoking histories. Counts were made of observed deaths and years of observation within different categories of smokers, and the observed deaths were compared to the number of deaths expected on the basis of similar counts made for non-smokers.

D. Problems

As in past years, the Branch's most persistent and troublesome unsolved problem is its inability to attract, employ, and retain competent, experienced programming personnel. All too often, when a programmer acquires sufficient experience to make a significant contribution to the programs of the Branch, he accepts more lucrative employment elsewhere.

E. Program Plans

Program plans for the Branch revolve primarily around the new and more powerful computer configuration scheduled for installation on a phased basis during FY 1966 and 1967. In anticipation of the profound changes and heavy demands that the new configuration will bring, a concentrated effort was begun during the last quarter of the reporting period to recruit a substantial number of experienced programmers and other professional personnel to augment the present staff.

F. Publications

Brunelle, R. H., Stacy, R. W., and Waxman, B. (Ed.): Systems programs in biomedical research. In Computers in Biomedical Research, Vol. 2. New York Academic Press, Inc., 1965.

Bradley, D. F., Merril, C. R., and Shapiro, M. B.: Reconstruction of protein and nucleic acid sequences, I. Systematics and computer program. Biopolymers 2: 415-444, 1964.

Bradley, D. F., Merril, C. R., Mosimann, F. E., and Shapiro, M. B.: Reconstruction of protein and nucleic acid sequences, II. Isotomers. Biochemical and Biophysical Research Communications Vol. 19, No. 2 255-260, April 9, 1965.

Juenemann, H. J.: News highlights. Computopics Vol. VI, No. 8, 16-17, March 1965.

July 1, 1964 through June 30, 1965

PUBLIC HEALTH SERVICE - NATIONAL INSTITUTES OF HEALTH

DIVISION OF RESEARCH SERVICES

Summary of Branch Activities

1. DRS-6
Serial Number

2. ENVIRONMENTAL SERVICES BRANCH
Branch

3. Edwin M. Lamphere, Sr San E
Branch Chief

I. SUMMARY

The Branch continued to approach its objectives primarily on the basis of solving problems brought to its attention by someone else. Although little progress is evident at the end of these short-term investigations carried out to solve individual specific problems, the researcher's present needs cannot be ignored in favor of an all-encompassing solution at some time in the future. Visible program progress must usually await the results of longer term development and surveillance activities.

As an aid in tracing the source of contamination in operating rooms, a method was perfected making it possible to correlate actual occurrences, as recorded on television tape, with results obtained through collection of bacteriological air samples.

In order to provide NIH with a satisfactory fume hood that does not require vast amounts of costly conditioned air, the Branch cooperated with RFPB in developing specifications for such a hood and worked with a manufacturer in producing a commercial model.

Since commonly used detection techniques are not suitable for differentiating between people who spread pathogenic organisms in operating rooms or pathogen-free animal areas and those who merely carry these organisms on the skin, a device was developed and used for making this differentiation.

As an example of the Branch's program of providing the scientist with the research environment he needs, an almost germ-free patient environment was attained through a cooperative effort with NCI, a manufacturer, and other DRS Branches.

II. BRANCH PROGRAMS

A. Objective

The objective of the Environmental Services Branch is to insure that a sanitary and otherwise satisfactory environment is maintained at NIH and its field stations.

B. Current Programs

Attainment of the Branch objective was approached through six separate but closely coordinated functional areas.

1. Occupational health engineering adapted specifically to the NIH clinical and laboratory research needs
2. Hospital sanitation
3. General sanitation
4. Insect and rodent control
5. Water supply--both potable and special purpose
6. Waste disposal--both liquid and solid

A sustained effort was made to keep the overall program, as well as the component parts, pointed directly toward the existing and ever-changing needs of the Institutes and Divisions.

Administratively, the Branch approached its objective by serving as consultant to line management of the Institutes and Divisions. Recognizing that Institute and Division management has a wide variety of problems other than those related to the environment, problems which are brought to management's attention by the Environmental Services Branch are accompanied by practical solutions tailored to the individual administrative and technical situation.

Most of the Branch workload has been of a trouble-shooting nature, whereby an individual problem is investigated and solved at someone's request. However, more time was devoted than in previous years to surveillance activities and solutions of problems on a reservation-wide basis.

With regard to the technical program areas, occupational health engineering is primarily concerned with problems involving air pollution, toxic and noxious fumes, toxic particulates, odors, sound and vibration, ultraviolet lighting, decontamination of laboratories or animal rooms, illumination, and ventilation.

The hospital sanitation activities are concerned only with the patient-care areas of Building 10. They are aimed primarily at infection control but also include some general sanitation work. Routine quarterly surveys are conducted in all operating rooms. Routine monthly surveys are carried out on six of the nursing units where the highest potential for problems exists. About half the time devoted to this activity is spent on routine surveillance. The other half is spent in providing corrective measures for potential problems and in locating the sources of infections which have occurred despite all ordinary precautions.

General sanitation activities are carried out throughout the NIH reservation and in the rented facilities in nearby areas. Emphasis is placed on infectious waste disposal, animal rooms, cafeterias, snack bars, vending machines, and housekeeping practices.

Closely associated with the general sanitation program are the insect and rodent control activities. In order to prevent undesirable infestations and the resulting potential for cross-infection between animals, patients, and staff members, an active control program is pursued. This program consists of routine applications of insecticides, maintenance of rodent trap and poison bait stations, and evaluation of factors which encourage the presence and reproduction of insects and rodents.

Water-supply activities are concerned primarily with problems involving the quality of potable and distilled water. In an institution as large as NIH, and with the high quality of water demanded by research work, there is always some type of water problem.

Waste disposal problems in which the Branch is involved include solid wastes generated by the research laboratories and animal rooms, the NIH sewer system, and the sewage treatment and disposal system at the Animal Center.

C. Program Progress and Accomplishments

Emphasis within the Branch was shifted to some extent during this reporting period with respect to both program content and to specific methods of carrying forward various parts of the program.

Changes in program content generally reflected selection of priority areas in such a manner that the greatest benefit to NIH accrues from the resources which are available from the Branch. Hospital sanitation and occupational health were given greater emphasis than in previous years. Accomplishments in these areas have justified the decision, and overall program gains are apparent. Development of special-environment equipment such as isolators and individually tailored protective devices was de-emphasized almost to the vanishing point. While no crisis occurred, the Branch lost the confidence of some investigators because of the low priority and resulting delays.

Training, routine surveillance, and long-term development work were given much higher priority than in previous years. The program has now developed to the point where more progress can be made in certain areas through these activities than by proceeding in some other manner.

Despite the increased emphasis on routine surveillance, training, and long-term development, the major portion of the workload has continued to be the solving of problems which are brought to ESB's attention by someone else. The Branch is now receiving telephone requests for assistance at the rate of about 4500 per year. While this is not necessarily a measure of progress with regard to solving NIH problems, it does reflect confidence on the part of the NIH community in the Branch's capabilities. It also reflects the development of a method for learning problem areas without the necessity of the staff spending considerable time looking for them. Action required as a result of these calls ranges from a solution of the problem on the basis of the telephone conversation alone to a study requiring several man-weeks.

Examples of assistance which consume a minimum of time include: (a) outlining procedures for decontaminating a laboratory floor after the spillage of bacterial or virus culture; (b) recommending the type of still which will give the investigator the quality of distilled water which he needs; (c) solving a noxious odor problem which is caused by something as simple as a dry sink trap; (d) checking the level of hazardous fumes in a laboratory in cases where the level is within allowable limits; (e) recommending autoclaving procedures for some unusual sterilization problem; and (f) collecting bacteriological samples in patient rooms to be sure that terminal cleaning has been effective.

Many requests for assistance require staff time amounting from a half-day up to several man-weeks. Examples of items falling in this category are: (a) design of ultraviolet light installations for special decontamination purposes; (b) design of units to protect research work from contamination; (c) design of water treatment facilities to provide relief from a single problem; (d) functional design of a sound-proof, light-proof, etc., room; (e) tracing contamination by pathogenic organisms to the primary source and devising means to break the connection between the source and patient-care area; (f) developing devices to protect the researcher in areas where limited ventilation prevents adequate fume hood performance; and (g) tracing to the source problems of cross contamination by fumes in laboratory buildings.

Routine service-type functions have gradually been reduced until the only remaining major areas are insect and rodent control, distilled water surveillance, and space decontamination.

Despite additional areas to be controlled on the NIH reservation, the NIH Animal Center, and in nearby rented space, a continuing increase in effectiveness of the insect and rodent control operations has allowed the same level of control to be maintained without staff additions since January 1961.

Considerable effort by the Branch was devoted in past years to upgrading the central distilled-water systems to the present satisfactory state. As is the case with many other activities, almost as much time must be spent in maintaining a satisfactory position as in arriving at that position originally.

For non-critical situations, simplified space decontamination procedures have been developed for implementation by the using organization. For critical or hazardous problems, the Branch continues to provide this service under professional supervision.

Significant gains toward reaching the Branch objective are not often apparent at the conclusion of some short-term investigation or routine survey. Rather, the gains become apparent after several months and are usually the result of a longer term study or surveillance activity. The following paragraphs describe some of the more important accomplishments of the past year.

Infectious-waste handling and disposal, which may or may not be kept under control, are always problems at biomedical research institutions. During the past year the problem at NIH has been kept under satisfactory control. At the present time, improperly handled cans of infectious wastes are arriving at the incinerator at the rate of only one every two or three months. Maintaining this low rate with the present system requires more time than the Branch would like to spend. A different system, using paper bags instead of metal cans, was field-tested on the tenth floor of Building 10. The concept proved to be practical and increased use, especially in new construction, is anticipated.

One of the major tools in controlling the exposure of laboratory personnel to hazardous gases or particulates is the properly functioning fume hood. Once satisfactory fume hoods are in place, a great many potential problems in the field of occupational health never become real. In the past, a properly functioning and an economically feasible fume hood have not been compatible because of the requirements for high volumes of conditioned air. In conjunction with the Research Facilities Planning Branch, a fume hood capable of utilizing 70 percent non-conditioned air was developed. During this past year, specifications were prepared so that NIH may obtain such a hood for future buildings; a commercial model was developed in cooperation with a manufacturer so that a mass-produced unit will be available; and plans were made for development of a system which will allow existing NIH fume hoods to be altered to the supplied air type.

In some areas of research--the most important being surgery, patient-care, and production of pathogen-free animals--personnel who shed pathogenic organisms cannot be utilized. Persons who carry these organisms on the skin or in the nose do not necessarily constitute a hazard. Only those who shed the organisms present a problem. Decisions to employ or not to employ and to transfer to other duties or not to transfer, based on the carrier state of an individual, are not only highly questionable from the technical standpoint, but are untenable from the personnel-management standpoint. To avoid these problems, a device was developed and is now being used to determine whether or not a person will shed pathogenic organisms during the course of his routine duties.

In some of the more promising areas of cancer chemotherapy, the patient's resistance to any infection is essentially destroyed as a side effect of the treatment. If the treatment is to have any chance of success, the patient must be kept in an almost germ-free environment. NCI purchased a commercially fabricated plastic isolator which was good in concept but poor in actual performance. A concerted effort by NCI and DRS resulted in a device that provided the required environment, and the research program has moved forward with apparently very gratifying results.

In tracing problems of contamination in operating rooms to the source, the lag between the time an organism is collected and the time the colony grows to identifiable size is too long for anyone to remember with any degree of confidence what happened in the operating room at the specific time the organism was collected. Even a running commentary on a pocket-size dictaphone does not reveal all needed information. A technique was developed by which air sampling results can be coordinated with complete coverage of the operation on television tape. This technique has proved very useful in identifying a problem in one of the surgical suites.

Good animal room sanitation is desirable under any circumstances and is particularly important at NIH, partly because of the large number of animal rooms. Odor problems originating in poorly maintained rooms cause inefficiency and lost time by personnel in nearby laboratories. Insect infestations are extremely difficult to control where there is access to gross amounts of spilled feed. The potential problem of cross-infection between animal rooms always exists. An infection in a patient was traced back to an animal room in another building. Routine sanitary surveys of animal rooms has resulted in considerable progress, but the point was reached where any substantial further progress depended on increased interest and understanding on the part of the animal caretakers. With this in mind, a cooperative Laboratory Aids Branch-Environmental Services Branch training program for animal caretakers was established, and two courses with 25 participants each were completed. The program was well received by the Institutes, and requests outnumbered available openings on both occasions.

D. Problems

Available resources in relation to the task to be accomplished is usually considered to be a problem in most organizations. However, a new aspect of this problem developed for the Environmental Services Branch during the past year and will become more acute during the next year. Due to its relatively small size and wide ranging, but thinly staffed, specialty areas, the Branch has never had much flexibility in meeting any large-scale new problems. In the past, two approaches have been available for providing the necessary response within a reasonable length of time. These were by (a) making manpower available by transferring to other organizations those activities not related directly to reaching the Branch objectives, and (b) requesting from the Office of the Chief, DRS, the money and personnel ceilings necessary to meet a developing problem area.

While these approaches have not absolutely disappeared during the past months, they have, for all practical purposes, ceased to exist as far as long-range program planning is concerned. With regard to transferring activities to other organizations, everything of any significance has already been transferred. With regard to assistance from the Office of the Chief, DRS, the flexibility for shifting resources within the Division has been reduced considerably below its previous level. A relatively static budget position coupled with this lack of flexibility has started to develop into a problem of major proportion for the Branch.

Provided research were to remain no more complicated than it is at present and provided that NIH were not to employ many more scientists for the Intramural Program, the problem could be controlled. However, it is certain that research will continue to become more complex, and the associated environmental services must increase in order to keep pace. The problem of an increasing Branch workload cannot be solved by decreasing the quality of the services without losing the confidence of the Institutes, and this confidence is essential for a successful operation.

The best chance for solving the dilemma appears to rest in the establishment of a definitive workload-measuring system. In addition to making some increase in efficiency possible, such a system should provide concrete information which would either justify budget increases or justify the discontinuing of some functions in order that resources may be committed to relatively more important functions.

E. Program Plans

No change is foreseen in the objectives of the Branch. However, emphasis will be shifted to some extent to reflect the changing priority status of some of the NIH problems.

Increased emphasis will be placed on two areas. Other areas will be de-emphasized accordingly. The two areas to receive increased emphasis will be (a) surveillance as it concerns biological hazards and (b) development of equipment to solve specific biohazard problems and to provide environments of higher bacteriological quality for clinical research needs. In view of NCI's progress in cancer-virus work and in chemotherapy requiring special environments for the patient, it appears that increased emphasis in these areas is essential.

Since available staff increases will not allow this work to be carried out in addition to normal activities, all other activities will be de-emphasized to varying extents with the exception of insect and rodent control. As a general guideline, priority will be given to health-related problems such as infection control in the Clinical Center, biological hazards in research areas, infectious waste-disposal, and control of hazardous fumes. A much lower priority is planned for nonhealth-related problems such as noise, vibration, chemical quality of water supplies, and animal feed inspections.

F. Publications and Patents

1. Weatherby, R. J., and Baldwin, M.: Microbial characteristics in a neurosurgical environment. Journal of the American Hospital Association. 39: 71-78, March 1965

2. Herman, L. G.: Environmental sanitation (annual administrative reviews) Journal of the American Hospital Association. 39: 55-60, April 1965

3. Weatherby, R. J.: Surface Soil Sampler, patent application No. 384-126.

PUBLIC HEALTH SERVICE - NATIONAL INSTITUTES OF HEALTH

DIVISION OF RESEARCH SERVICES

Summary of Branch Activities

1. DRS-7
Serial Number

2. RESEARCH FACILITIES PLANNING BRANCH

3. Howard M. Biggs
Branch Chief

I. SUMMARY

Significant progress was made during the past year toward completion and occupancy of several research facilities in the current NIH construction program. The present Research Facilities Planning Branch program comprises over 20 major projects having a total estimated cost in excess of $75 million dollars in the planning, design, or construction stage. Design work was completed on several projects and construction will begin in FY 1966. One major construction project, Phase I of the NIH Animal Center, was completed during FY 1965, and construction work started on three others. Development of design guidelines, use criteria, and materials evaluations in areas such as animal caging, distilled water piping systems, and floor and wall coverings provided valuable support and assistance to the design and construction programs of both the NIH and other medical research institutions.

Favorable working relations with Public Buildings Service representatives in the Central and Regional Offices are essential to the success of the NIH construction program. Constant effort is being made to improve and strengthen these relationships. GSA Region 3 assigns a Project Manager and staff as PBS representatives to coordinate and supervise all PBS construction at the NIH reservation. Rapport and cooperation between the office of the Project Manager and the RFPB continue to improve.

Other agencies such as the National Capital Planning Commission, The Commission of Fine Arts, and the Maryland-National Capital Park and Planning Commission can, and do, exercise considerable influence in certain aspects of the NIH design and construction program. These agencies represent the interests of the community. Their advice and counsel can be extremely helpful in assuring that the NIH construction program contributes to the orderly growth and development of the area, and enhances the quality and character of Federal architecture and construction. Concurrence in, and support of, NIH plans by these agencies is most important in their execution.

In addition to the aforementioned agencies, certain projects frequently require approval and negotiations with local public utility agencies, such as the Washington Suburban Sanitary Commission. The processes attendant with obtaining the approvals and concurrences from these agencies are time consuming and require considerable preparation and coordination.

II. BRANCH PROGRAMS

A. Objectives

The major objective of the RFPB is the coordination of planning and construction of new facilities on the NIH Reservation and at its field stations. This is supplemented with a secondary objective of providing development engineering services and technical assistance where special problems in design or construction are encountered.

B. Current Programs

The design program is primarily responsible for determining that new construction provides for the program needs of NIH research scientists. A staff of professional engineers is employed to render limited consulting service and to provide coordination between contract architects, NIH research staff members for whom facilities are being provided, and other branches of the Division of Research Services.

The construction program provides close technical control of new facilities for NIH during the construction phases. A staff of construction management engineers maintains surveillance during construction to determine that the facility is constructed according to plans and specifications, with particular emphasis on those aspects peculiar to NIH requirements.

The current development program is directed toward improving the functional aspects of facilities presently under design as well as contributing standards, recommendations, and solutions to operational problems encountered in exisiting NIH facilities. Technical support rendered to the design and construction programs falls into a wide spectrum of activities, such as: (a) planning areas to accommodate special research techniques; (b) developing equipment peculiar to laboratory processes and personnel safety; (c) improving the care and quality of research animals through automation and environmental control; (d) standardizing laboratory furniture to effect economical procurement measures; and (e) searching for improved materials to reduce maintenance and operational costs.

Members of the RFPB staff are frequently called upon to meet and confer with visiting research scientists and engineers relative to current concepts, techniques, and practices in the design and construction of biomedical research facilities. These visitors represent a broad spectrum of national and international medical research activities, both government and private.

C. Progress and Accomplishments (for a summary of all design and construction projects, see Table I, pages 7-11 and 7-12, and Table II, page 7-13.)

NIMH/NINDB Building - (Building 36)

The Architect/Engineer started design of this project in July 1961, and the preliminary design was approved early in 1962. Drawings reflecting work through the tentative design stage were submitted for approval in November 19

Delays at this point, including those due to negotiation of the A/E fee, held up additional design work until early summer 1963. The revised tentative drawings were submitted to PBS on August 22, 1963, and approved on September 13, 1963. The intermediate working drawings were submitted on March 20, 1964, and the complete working drawings on June 29, 1964. NIH comments were forwarded to PBS on August 11, 1964. The A/E requested an $11,000 additional fee for incorporating the NIH and PBS comments in the final working drawings. This request was rejected by PBS on September 24, 1964. Progress at this stage was also delayed by negotiation of an addition to the A/E fee for work related to deleting the emergency generators from the project. This was resolved on November 20, 1964, with a $5,750 increase in the fee as recommended by NIH.

Final working drawings were submitted by the A/E on February 9, 1965. The PBS review revealed a number of discrepancies, particularly in the mechanical drawings, which required correction and resubmission by the A/E. Corrected drawings were completed on April 12, 1965.

This building, the NCI Building, and the Cafeteria were advertised as a package project for construction bids on May 25, 1965. Award of a construction contract should take place early in FY 1966.

NCI Building

The NCI Building was designed by Smith, Hinchman & Grylls Associates, Incorporated, who also designed the NIMH/NINDB Building, and the designs are proceeding concurrently. Extensive revisions in the early stages of design were required to bring the estimated cost in line with available funds for the project. Revised drawings of work completed at the tentative stage of design were submitted on August 22, 1963, and approved by PBS on September 13, 1963. Design work at this stage was delayed approximately five weeks pending resolution of the location of air intakes. Drawings were again reviewed at the intermediate design stage in March 1964, and complete working drawings were submitted on June 29, 1964.

The delays in design of the NIMH/NINDB project have also delayed this project, and the corrected final working drawings were not completed until April 12, 1965. Award of a construction contract for the package project is expected early in FY 1966.

NCI-NIMH/NINDB Cafeteria (Building 35)

This building is the third in the complex encompassing the NIMH/NINDB and the NCI Buildings and is being designed concurrently with these buildings by the same A/E. The Cafeteria was initiated in August 1962; however, approval to proceed with the design was not received until May 1963. Slippage in the A/E's design schedule delayed submission of the diagrammatic sketches for the project until November 12, 1963. The A/E concept as delineated by the diagrammatic sketches was approved, with some modification, by the Research Facilities Advisory Committee on February 7, 1964. On April 8, 1964, the RFAC approved the exterior design of the building.

Drawings reflecting work through the tentative design stage were submitted on April 27, 1964. Submission of the intermediate working drawings was delayed until October 2, 1964. Complete working drawings were received on December 8, 1964, and the NIH comments forwarded to PBS on January 5, 1965. The final working drawings for the Cafeteria were integrated with the other two buildings in the project. As previously described, the project was advertised for bids in May, and a construction contract award can hopefully be made early in FY 1966.

NIH Animal Center, Phase I

Phase I construction at the NIH Animal Center was completed, and the buildings turned over to the NIH for occupancy in March 1965. Landscaping and correction of deficiencies will be completed in FY 1965. Construction was completed nearly on schedule; however, there were some delays due to adverse weather conditions, contract changes, and the remote site location.

NIH Animal Center, Phase IA

Early in 1963, allowable total costs for this project were reduced by the Bureau of the Budget from the $1,735,500 requested in the Program of Requirements to $1,330,000. The revised POR for the project was approved in June 1963. As revised, the project encompasses a General Laboratory Building, Animal Behaviour Laboratory, and Waterfowl Habitat for the NIMH, and a Primate Building for the Laboratory Aids Branch of DRS. The project also includes an incinerator and additional utilities for the Animal Center. Diagrammatic sketches were initially submitted on January 17, 1964. Revisions required to meet the needs of the program delayed approval of the diagrammatics until April 22, 1964. The tentative drawings were submitted to NIH on August 6, 1964. The PBS cost estimate prepared at this stage of design was $244,000 greater than the allowable funds. This estimated deficit has been reduced to $115,000. Funds in the amount of $115,000 have been requested for this phase of construction in the FY 1967 preliminary budget. The tentative drawings are now being revised, and it is expected that the design work can be completed in the first half of FY 1966.

NIH Animal Center, Phase II

Initial planning for this phase of work began in 1963. POR's for the Agricultural Management Building, Animal Production Facility, a third residence, and the necessary supporting utilities and grounds improvements have been approved by the client users. Draft POR's for a third kennel wing, and a Waste Chemical Disposal Facility have been prepared and are being reviewed by the programs. Prototype primate cages are being developed and tested. Design work by the A/E on this phase is expected to begin early in FY 1966.

NIH Office Building Extension, Building 31C

This project was authorized in FY 1962 with the appropriation of $700,000 for planning. Approval of the POR by the BOB was delayed pending resolution of the vehicle parking requirements. In May 1963, the BOB approved the POR with "on-grade" parking, and the A/E design contract was negotiated in July 1963. Preliminary design work and studies were formalized in the diagrammatic sketches submitted in Marcy 1964. Tentative drawings were submitted in July 1964 and approved by PBS in October 1964. Intermediate drawings were submitted in February 1965, and work is progressing satisfactorily toward complete working drawings. Design work should be completed late this fiscal year or early next year. Construction funds in the amount of $5.5 million dollars were provided in the FY 1965 appropriation.

NINDB Perinatal Research Laboratory

Funds for design and construction of this project were provided in FY 1963. Legal problems with transfer of the necessary land to the United States Government delayed submission of the POR to the BOB until March 1964. In June 1964, the BOB approved the POR providing 26,000 gross square feet at a total cost of $850,000. An A/E firm was selected for the design of this facility, but no agreement has been reached on the estimated construction costs. Negotiations are still suspended pending resolution by NIH to either request additional funds or reduce the scope of the project.

NICHD Temporary Laboratory, Puerto Rico

In August 1964, the Director, NIH, tentatively approved a joint NINDB-NICHD request for construction of temporary laboratory facilities at the USPHS Outpatient Clinic and Quarantine Station, San Juan, Puerto Rico. Total cost of this construction is not to exceed $150,000 and is to be financed from the NICHD FY 1965 operating budget. In March 1965, the POR was forwarded to PHS for approval. The POR provides for a laboratory structure of 5,000 gross square feet and a storage structure of 1,000 gross square feet at a total cost of $150,000. A design contract was negotiated early in May 1965. Beneficial occupancy is anticipated early in 1966.

Gerontology Building, Baltimore, Maryland

The POR for this project was completed in March 1962. Delays were encountered in completing the collaborative gerontology program with Baltimore City Hospitals and in the final transfer of land to the United States Government. The A/E was selected early in 1963 but actual design work was not started until June 1963. The diagrammatic sketches were submitted August 19, 1963; however, they required extensive revisions before final approval on December 27, 1963. Tentative drawings were submitted in April and approved May 21, 1964. The intermediate working drawings were submitted on October 21, 1964, and approved December 9, 1964. Complete working drawings were submitted February 12, 1965, and approved April 12, 1965. Incorporating the comments of both NIH and PBS into the final working drawings will delay advertising for construction bids for this project until late in FY 1965 and the contract award until FY 1966.

DBS Extension, Building 29A

The POR for this project was completed in March 1962, and the A/E contract for the design work was negotiated in October 1962. Diagrammatic sketches were submitted in January 1963 and approved in February 1963. Design work proceeded on schedule, with tentative drawings being submitted in June and approved in August 1963. Intermediate working drawings were submitted on November 1, 1963, and approved December 17, 1963. At this stage of the design the project was delayed four months by PBS negotiations with the A/E for amendments to his design contract. Complete working drawings were finally submitted on May 15, 1964. The cost estimate made by PBS at this stage of design indicated that the project was over the budget. Following considerable delay in attempting to resolve this deficit, NIH and PBS agreed to proceed with the design without additional change. The final working drawings were submitted on November 5, 1964. The project was advertised for construction bids on December 17, 1964, and bids were received on January 28, 1965. The George Hyman Construction Company of Washington, D. C., was the low bidder, and the construction contract was signed on February 26, 1965. Additional construction funds in the amount of $407,000 were made available for this project. Construction was started March 22, 1965, and job progress to date has been satisfactory. Barring unforeseen delays, construction should be completed on schedule, and beneficial occupancy should be provided by December 1966.

Master Utilities Extension

Planning funds for this project were provided in FY 1962. A Master Site Plan study and report were completed by the A/E in December 1962. The POR for extensions to the NIH utilities systems was completed concurrently. The program is divided into two phases. Phase I includes extension and expansion of systems required to supply those new facilities being constructed under the current construction program. Phase II will provide utilities for the remainder of the buildings planned for construction under the Master Site Plan. Estimated costs for planning and construction are $7.5 million dollars for Phase I and $3.5 million dollars for Phase II.

To meet the immediate needs of the current NIH construction program, design of those utilities required for the Central Services Building Extension, 12A, and the extension to the DBS Building, 29A, has been accelerated. Final working drawings on this work were completed in August 1964, and the project advertised for bids on October 5, 1964. Bids were opened November 5, 1964, and a construction contract awarded to the low bidder, Airmaster Services, Incorporated, Silver Spring, Maryland, on January 6, 1965. At the request of NIH, the general contractor, has concentrated its efforts on providing the necessary utilities services for the extension to the Central Services Building, 12A, which is scheduled for completion in June 1965. Maximum effort is being exerted to accomplish this work with minimum interference and disruption of research activities and existing roads and parking areas. Construction of this phase of the work is scheduled for completion by January 1966. Design work for the balance of construction to be accomplished under Phase I is expected to be completed and advertised for bids in the first half of FY 1966.

The new buildings under construction and those presently being designed will require an increase in water and sewer service to the NIH reservation. Representatives of NIH and GSA have met with the Washington Suburban Sanitary Commission (WSSC) to discuss this increased service; however, negotiations have been proceeding slowly. Separate contracts with the WSSC are being negotiated by GSA for construction of new water and sewer mains and for expected water consumption.

Warehouse Extension

In the FY 1964 appropiration, $780,000 was provided for planning and constructing approximately 43,000 gross square feet of additional warehouse space as a fourth-floor addition to Building 13. Subsequent planning studies indicated that these facilities should be provided in a separate structure located in the NIH general service area. This alternate location was approved by the PHS Division of Finance and the Division of Aministrative Services. The A/E contract for design of the project was negotiated with Palmer and Baker Engineers, Incorporated of Mobile, Alabama, and Washington, D. C. Design should be completed during FY 1966.

Child Research Center (NIMH)

This project is being financed through the GSA FY 1965 Construction Program. The National Capital Planning Commission and the Maryland-National Capital Park and Planning Commission approved the site, and an A/E firm, Johannes & Murray & Associates of Silver Spring, Maryland was retained for the design. In March 1965, the Research Facilities Advisory Committee reviewed and approved the general layout and space arrangement as delineated in the A/E's diagrammatic sketches. Design work is proceeding and will be completed in the second half of FY 1966. Beneficial occupancy of this facility is projected for July 1967.

Basic Research Laboratory, Lexington, Kentucky

The construction contract for this project was awarded to Barco, Incorporated, of Lexington, Kentucky, on August 4, 1964. The construction contract is being administered by GSA's Region 5 Office in Chicago, Illinois, and some delays in construction progress have resulted from delays in administrative action by that Region. However, the contractor is still confident that he will be completed on schedule and that the building will be ready for beneficial occupancy early in FY 1966.

Development Projects

Program studies, the majority of which are of short duration, are reported and distributed internally to interested NIH organizations and/or published in trade journals. Requests for available information from extramural activities are also honored. These generally originate through the Division of Research Facilities and Resources.

Limited research contracts continue to be effective and efficient means for increasing the quality of accomplishment and for conserving manpower and money. Such contracts also increase program flexibility and provide detailed specialization where required.

Collaborative Projects

Improving Animal Care Facilities (in collaboration with Laboratory Aids Branch).

In recognition of the vital importance of laboratory animal care facilities to NIH research, a continuous research and development program for the improvement of animal care facilities has been sustained. Investigations generally fall in the categories of product and material testing, prototype development, and factors research. Work undertaken has included: (a) the development of caging systems for the NIH Animal Center Phases I, IA, and II; (b) the development and partial evaluation of a completely automated rat breeding cage with automatic watering and cage cleaning features (presently partially complete); (c) development, through a joint program with Toledo Scales Company, of a rodent classifier which automatically weighs and sorts mice to a pre-set standard; and (d) a comprehensive study to test and evaluate commercial casters in view of the limited availability and high cost of special NIH casters in small quantities.

RFPB also provides technical assistance and advice to other NIH groups in preparing design guidelines, criteria, specifications, and standards for equipment and facilities.

As a means of stimulating new approaches and introducing new concepts, numerous visits to laboratory and animal facilities were made. Information from private institutions, as well as other government facilities, has served to foster novel ideas and solutions to operational, design, and construction problems here at the NIH.

Infomational Reports

1. Criteria for Cold Rooms
2. Monolithic Floor Coverings for Specific Pathogen Free Animal Rooms
3. A Study of the Feasibility of Portable Fume Hoods for Use in the New NIMH/NINDB Building
4. Investigation of Heat Exchanger Applications to Research Facilities
5. Survey of Glassware Washing Facilities
6. Research & Development Team Project Reports (e.g. Sipper Tube Evaluation, Caster Testing, Small Animal Transportation Problems)
7. Distilled Water Distribution Systems.

D. Problems

One of the most serious problems in the Research Facilities Planning Branch design program is the almost inevitable slippage which occurs in estimated progress schedules for design. This slippage, and the delay in the start of construction of the facility, defers implementation of the research program for the client institute and frequently results in construction costs greater than those estimated in the planning stage.

The RFPB has made a thorough analysis of this slippage and has concluded that a major factor is the excessive time lost during plan review periods. The schedules for these review periods are established during the A/E negotiations and tend to take an overly optimistic view of what constitutes reasonable time for review by both the NIH and the PBS.

RFPB Project Engineers are required to maintain close supervision of the design schedules, and vigorous efforts are made to accelerate the review periods at NIH and at the PBS. Shortage of sufficient personnel at PBS, particularly in certain disciplines such as the Estimates Division, continues to be a problem. Experience to date has shown that "on-the-board" reviews performed in the offices of the A/E are most effective in accelerating design reviews.

Some additional examples of major delays which have occurred are itemized as follows:

1. Insufficient funds to adequately design Phase IA of the NIH Animal Center contributed toward a delay from August 1964 at the tentative submission to April 1965.

2. Additional design fee requests on the NCI-NIMH/NINDB project have causedsignificant delays.

3. The Master Utilities Extension, Phase IB, has been delayed from August 1964 to April 1965 due to a greatly increased estimate at that preliminary design submission.

4. On the Warehouse project, a request for A/E negotiations left NIH on January 11, 1965. This recommendation left DHEW by a letter to GSA dated January 13, 1965. The A/E negotiations were not held until March 26, 1965.

5. Various projects (NIMH Child Research Center and the Second Chilled Water Plant) have been significantly delayed as a result of required approval by The Commission of Fine Arts and the National Capital Planning Commission.

6. Negotiations with the WSSC for additional water and sewer services, which are needed for the expanding construction program, have required almost constant effort and diligent follow-up to accomplish nearly insignificant progress.

Continuing action is being taken by the RFPB to alleviate these problems.

The Public Buildings Service, which has direct responsibility for construction contract administration, is still encountering difficulty in hiring and retaining competent personnel for construction supervision and inspecti Current A/E contracts for design of NIH facilities include an optional provision for supervision of the construction by the Architect/Engineer under the direction of the PBS.

E. Program Plans

Construction work on a substantial number of projects currently in the design stage will start in FY 1966. Activity attendant on this increased construction program will require careful planning, coordination, and cooperation to avoid interruption and interference with NIH research activitie Recruiting of additional staff to meet the Branch responsibilities in this program is in progress.

The current and future development program will continue to place strong emphasis on the design-support function for the NIH facilities planning, design, and construction program. Areas of investigation presently being studied in depth are as follows:

1. Fume hood ducting materials
2. Economic analysis of auxiliary-air fume hood operation
3. Flooring materials for SPF animal areas and other applications (continuing study)
4. Techniques in washing cages, planning cage washing areas, and evaluation of commercial design (ESB)*
5. Distilled water distribution system materials
6. Testing and evaluation of casters for animal cage racks
7. Caging for NIH Animal Center (LAB)*

* Denotes collaborating organization.

F. Publications and Patents

None to report.

TABLE I - RFPB - 1965 Program of Authorized Design Projects

Project	Design Completion Date	Construction Completion Date	Construction Cost*	Planning Cost	Total Project Cost	A/E Designer
NIMH/NINDB Bldg.	4/65	2/68	$8,620,000	$ 619,000	$9,239,000	SH & GA, Inc.**
Cancer Research Bldg.	4/65	2/68	8,886,000	610,000	9,496,000	SH & GA, Inc.
NCI-NIMH/NINDB Cafeteria Building	4/65	2/68	836,500	53,500	890,000	SH & GA, Inc.
NIH Animal Center, Phase IA	9/65	1/67	1,350,000	95,000	1,445,000	Heery & Heery
NIH Animal Center, Phase II	11/66	9/68	7,203,000	517,000	7,720,000	Not selected
NIH Office Bldg. Ext.	6/65	1/67	5,850,000	350,000	6,200,000	K, L, &C** C, G, & Van A.
NINDB Perinatal Lab, P.R.	4/66	6/67	790,000	60,000	850,000	Not selected
NICHD Temporary Lab, P.R.	8/65	4/66	140,500	9,500	150,000	Not selected
Gerontology Bldg.	4/65	9/67	7,500,000	1,000,000	8,500,000	CS & D & LW, C & W**
Bldg. 29A, DBS	11/64	12/66	4,839,000	288,400	5,127,000	SH & GA, Inc.
Master Util.-Phase I	9/65	9/67	6,839,000	497,000	7,336,000	HDNA**
Warehouse Extension	3/66	8/67	723,500	56,500	780,000	Palmer & Baker Engrs.
NIMH Child Research Ctr.	1/66	7/67	871,000	73,000	944,000	Johannes & Murray***

+ See following page for footnotes.

TABLE I - RFPB - 1965 Program of Authorized Design Projects

* Includes construction contract cost and other construction cost.

** SH & GA, Inc. - Smith, Hinchman & Grylls Associates, Inc.
K, L, & C - Keyes, Lethbridge & Condon
C, G & Van A. - Carroll, Grisdale & Van Alen
C. S. & D. and LW, C & W - Cochran, Stephenson & Donkervoet and Lucius White, Clay & White.

*** Latest Estimate of Cost.

TABLE II - NEW CONSTRUCTION 1965

Building	A/E	Design Completion Date	Contract Awarded	Contractor	Amount in 000**	Comple-tion Date***	Construc. Schedule (Months)	Contract Overrun (Months)****
NIH Animal Center, Phase I	HSM&M*	3/13/63	5/31/63 1/	J.McShain, Inc.	$3,103	11/11/64 2/	17	4
Biologics Standards Building 29A	SH & GA*	12/17/64	2/26/65	Geo.Hyman Constr.Co.	$4,151	11/6/66	20	-
Master Util.Ext. Phase IA	HDNA*	10/5/64	12/4/64	Airmaster Services,Inc.	$ 568	12/24/65	12	-
Basic Research Lab. Lexington, Ky.	LDC*	5/12/64	8/4/64	Barco, Inc.	$ 314	7/14/65	11	-

* HSM&M - Hayes, Seay, Mattern & Mattern
SH & GA - Smith, Hinchman & Grylls Associates, Inc.
HDNA - H. D. Nottingham & Associates
LDC - Lawrence D. Cammack

** Does not include contingencies, supervision, or planning costs
*** By terms of contract
****Delay beyond completion

1/ Delayed due to high bidding and insufficient funds
2/ Actual acceptance date--3/15/65

June 1965

July 1, 1964 through June 30, 1965

PUBLIC HEALTH SERVICE - NATIONAL INSTITUTES OF HEALTH

DIVISION OF RESEARCH SERVICES

Summary of Branch Activities

1. DRS-8
Serial Number

2. BIOMEDICAL ENGINEERING AND INSTRUMENTATION BRANCH

3. Gerald S. Cohen
Acting Branch Chief

I. SUMMARY

The Biomedical Engineering and Instrumentation Branch provided NIH ongoing research programs with electronic and mechanical instruments and devices and supplied engineering support to the research staff. The Branch processed approximately 11,500 projects which involved design, fabrication, or repair of equipment ranging in complexity from simple devices to large instrumentation systems. In addition, the Branch supplied technical consultations for 6,500 requests.

II. BRANCH PROGRAMS

A. Objectives

To provide the tools for ongoing intramural biomedical research projects through the design, development, fabrication, and servicing of electronic and mechanical equipment and instrumentation systems.

To make available to the clinician and researcher technical support in the engineering disciplines to assist him in experiment design, instrument selection, and data handling and analysis.

To provide biomedical engineering activities outside NIH with information on new developments, engineering and technical knowledge, training programs, and support facilities.

To alert scientists, engineers, and students of the importance of biomedical instrumentation to medical progress, its career opportunities, and its educational requirements.

B. Current Programs

The current programs of the Branch provide:

1. Direct assistance to the research programs through high-level biomedical engineering support in the form of equipment development resulting in creative hardware and the application of engineering principles to further research techniques.

2. Engineering consultation and training for the clinician and researcher on the selection, application, and operation of the wide and complex variety of nonstandard and industrial scientific equipment available to medical research.

3. Fabrication of prototype specialty instrumentation not available commercially, and alteration or modification of commercial equipment; and, to the research programs through direct consultation, fabricated products not requiring professional engineering endeavor.

4. Service failure diagnosis, repair of biomedical instruments and instrumentation systems, and extension of preventive maintenance programs.

5. Reports of technical accomplishments through publication of articles in professional journals and the presentation of papers at scientific meetings.

6. Awareness of the importance of biomedical engineering to medical research, using various means such as publishing articles on biomedical activities in professional journals and addressing educational meetings.

7. Engineering developments to research organizations outside NIH, universities, and commercial manufacturers, upon request.

8. Review of biomedical engineering grants, manuscripts, and patent reports of NIH staff members and grantees.

In addition to the foregoing, Branch members serve on biomedical engineering committees of national professional societies and advise on fellowship awards.

C. Program Progress and Accomplishments

1. Engineering Advances

Items of major advances in engineering methods, development, design, and fabrication of instrumentation as applied to medical research and considered biomedically significant to the NIH program were:

Constant Current Square Wave Stimulator An electronic stimulator and monitor for use in clinical neurological examinations. The stimulator has a constant current square wave output which is completely isolated from ground and AC power lines. These important features minimize (a) electrode polarization, (b) effects of changes in load impedance, and (c) damage to the region receiving stimulation. Both the amplitude and the period of the square wave may be independently changed to provide a variety of experimental stimuli. The monitor unit contains an isolated current probe and integrating amplifier for monitoring the output of the stimulator, and an electrode impedance tester consisting of a stable 500-cycle sine wave generator with associated metering circuitry.

Operating Room Console A portable unit used in the O.R. for microelectrode recordings from human patients. It includes six-channel analog tape recording capability, monitoring provision, and all required power supplies and amplifiers for use with the microelectrode preamplifiers. Three additional differential amplifiers are available for electromyography and other purposes.

High Voltage Quench Unit A high voltage quench unit for use with an arc discharge chamber. The unit senses a discharge and quenches the high voltage to the gap for an adjustable interval. In addition, it provides outputs for monitoring and counting. A photomultiplier tube installation is included in the chamber.

Control Clock for Digital Data Acquisition System A controller for a Dymec DDA system. The controller both initiates the multiplexer scan and provides an output indicating the time elapsed between scans. A frequency divider and a preset decade counter, operating from the Dymec 100KC clock, generate "initiate scan" pulses with intervals that can be preset from 1 to 999 seconds in one-second increments. A pulse train of short duration containing a number of pulses that correspond directly to the number of seconds preset on the scan timing control is generated. This pulse train is put into one of the data channels of the Dymec. The pulses are counted and recorded and represent the time elapsed since the last scan was initiated. This is the first equipment built at NIH which employs the new microcircuit techniques. The controller used approximately 15 microcircuit units. This would correspond to 500 transistors and resistors if conventional circuitry were used.

Solenoid Controllers Designed for use in stop flow experiments. They feature several adjustable delays and switching to select various input and output triggers.

Motor Coordination Tester Computer controlled device for the testing of patients with motor deficits. A two-way, on-line computer controls the test and reduces the data, providing a quantitative evaluation of the patient's motor performance.

Tetrascanner An improved version of an earlier NIH model dual-probe scanner. This new model scans four aspects of the brain simultaneously with marked improvement in the resolution of the scan pattern. The simultaneous scanning is important to dynamic studies of isotopes in the cerebro-spinal fluid system. The new model, as compared to the old, can test a larger number of patients in a given period of time. The patients remain immobile for as little as 25% of the time originally required to make a scan. The system has safety devices in case of malfunction and does a complete scan automatically.

Automation of Microtechniques to Viral Serological Investigations Four devices have been developed and others are being designed to automate parts of the procedures which are now performed by hand. These include the making of accurate dilutions and complement fixations and determining quantitative results of blood samples supplied by 14 hospitals. Approximately 400 tests are run per day. After these devices are laboratory-tested, applicable portions of the instruments will be combined to form parts of the automated system.

Artificial Kidney A dialysate system for use with multiple kidneys. The dialysate can be produced and delivered simultaneously to as many as ten patients. Two hundred gallons of a concentrate of the necessary salts and sugars are stored, mixed in a 30:1 ratio with tap water, and pumped to the bedsides. A self-regulating pump automatically adjusts its output to the demand of the patients. Safety features include the monitoring and adjusting of the concentration of the dialysate, its temperature, pressure, and flow rate, as well as blood leakage into each artificial kidney.

Automated Microtome A study is being made of the tissue section preparation process with a view to automating as many steps as possible. The principal part of such automation deals with the microtoming of blocks of embedded tissue, the removal of each section as it is cut, and its placement on a slide for subsequent staining and study. A prototype, part of a feasibility study, mounts the embedded tissue in the microtome, then cuts, removes, and mounts each section on a glass microscope slide.

Hydra Cell A chamber of approximately 0.08 cc volume for measuring the respiration rate of hydra. The cell must be closed quickly and must maintain a constant, known volume of water. An oxygen electrode is inserted within the cell and stirring is accomplished so that the hydra are not injured. A teflon stopcock, through which the cell is filled, when rotated, seals the cell and establishes the fixed volume. A small magnetic stirrer is built into a cavity in the stopcock. A 90° rotation brings the stirrer into the cell. A fine screen above the stirrer protects the hydra, and a rotating external magnet provides the motive power.

Tissue Dehydrator An automatic machine to reduce hand labor processing. The preparation of fragments of tissue for electron microscopy requires a sequential replacement of water with ethanol and ethanol with a methacrylate. This machine changes the amount of ethanol in a series of dilutions from 65% to 100%. The samples are held at each stage of dehydration for a preselected period of time before the next stage is initiated.

Blood Vessel Stapler A hand-held stapling device suitable for (1) in-vivo closure of blood vessels and (2) constructing tubes from thin tissues, such as fascia, for implantation. The tantalum staples used are 0.3 mm thick and 2.5 mm long. In order to control tube diameters, the staples are injected from the tip of the device in such manner as to permit no subsequent looseness to appear in the tissues.

Intra-Oral Pressure Transducers Subminiature pressure transducers map pressure distributions throughout the oral cavity during controlled articulations. Standard data are obtained from control patients for use in speech therapy and repair of cleft palates. Resistance-type strain gages serve as sensing elements in two types of transducers: cantilever beam and diaphragm.

Apparatus for Head Injury Research An apparatus for achieving control of some experimental variables previously not controlled. Monkeys undergoing test can be immobilized without anesthesia. A controlled, known mechanical shock can be administered to any point on the test animal's head. Restraints can be removed automatically just as the shock is applied so that the head and upper spine are free to recoil and so that high speed motion pictures can be made of the reaction.

2. Work Load Reporting

Improved work load reporting methods have been established. Available statistical data will permit more reliable forecasting of personnel needs, better distribution of resources, and more accurate indication of space requirements.

3. Space

The facilities of the Building 10 shop now being relocated in the B2-area of Building 10 will accommodate an additional staff of five and should result in quicker service on routine and emergency jobs and less overtime.

Split shift operations were inaugurated in January in one section. This arrangement has resulted in better utilization of space and equipment and will result in significant savings in future requirement of capital equipment. The Branch plans to expand these operations to other applicable areas as the need arises. An important by-product of this move has also resulted in quick reactive service to Institute requests and in less overtime.

4. Inventory

Branch inventory representing an investment of $90,000 was placed on a data processing system. Sufficient experience has now been accumulated to develop an economic order quantity system which should result in further savings.

5. Contracts

To provide not only a control but the full utilization of the engineering capabilities available, a research type of contract was let to Beckman Spinco Corporation. This pilot contract provided not only service but technical assistance from and consultation with the company on a demand basis. The results have been extremely beneficial to the NIH researchers. The Branch plans to extend this type of contracting where possible and also to define and implement other service contracts that can be technically monitored and oriented to the changing needs of the NIH researcher.

6. Instrument Loan

During the past two years, the Branch has loaned test equipment to researchers on a temporary basis for performing certain measurement or instrument experiments. This policy was initiated with the intent that a loan rental system could be implemented in the future which would result in instrument cost savings. A log kept during the past year shows a loan, or turnover, of instruments worth approximately $50,000 - $40,000 to individual researchers and $10,000 to

Branch engineering staff working in support of particular research projects. Fifty-eight instruments ranging in price from $8 to $6,200 were loaned to 35 individuals. The continuation and expansion of this program is limited by lack of equipment and space.

7. Training

The program objective is to raise the professional and technical level of Branch personnel in order to provide improved service to NIH researchers in biomedical engineering and instrumentation design and maintenance. Twenty-five employees participated in various training programs totaling 330 man-days. Of this number, 10 (230 man-days) took formal courses in educational institutions and 15 (100 man-days) received specialized training on various types of equipment. The latter was provided both at the manufacturers' plants and at NIH.

The Branch plans to continue the program for several years to elevate the capabilities of its personnel in order to keep abreast of the rapidly changing aspects of medical instrumentation and to cope with manpower limitations.

D. Problems

1. Under present and proposed Management Fund personnel ceilings, it is becoming increasingly difficult to meet the engineering needs of the Institutes. The Branch is called upon to provide long- and short-term engineering service and, in addition, provide a "quick reaction" capability to meet the more urgent needs of critical research programs. Under these circumstances the Branch will attempt to provide responsive service to the maximum number of requesters through the continued judicious use of manpower.

2. Comprehensive studies were conducted to determine (a) the most efficient use of available space, and (b) future space needs through FY 1967. Approximately 3,400 sq. ft. of space will probably become available during the early part of FY 1966. This will greatly relieve the space problems.

3. During the early part of FY 1965, the Civil Service Commission abolished the Instrument Maker and Glassblowing Series. This action necessitated the rewriting of all positions in these categories and resulted in job audits of all concerned and in establishment of new position descriptions. These actions, to date, are approximately 50% complete.

4. Position descriptions in the area of equipment maintenance have been difficult to define and have not yet been completed.

5. Long delays in recruitment for position vacancies were caused by lack of qualified applicants, outdated Civil Service registers (since corrected), and need for establishment of position descriptions.

E. Program Plans

In addition to carrying out the aims listed under "Objectives," the Branch will continue with present programs. Additional plans include:

1. Improvement of the Work Load Reporting System

Such improvement will provide the means to justify, when necessary, increased Institute support both from a staffing and a space viewpoint.

2. Improvement of Revolving Fund Operation Reports

That part of the Branch under Revolving Fund operations at present uses CDPB reporting facilities. Plans call for introducing a system of work accountability that will indicate the kind of work done, the requester, and the cost. This information will be melded into the computer inputs to provide work load data on a laboratory and Institute basis. It will also provide technical information for specific instrumentation and a means for obligating or estimating funds based on monthly historic averages for each laboratory, as well as segregating routine work into definable categories.

3. Extension of Split Shift Operations

The split shift operation implemented early in January has provided overnight service for both clinical and research areas and has reduced overtime. Extension of this plan to other areas will accomplish the same results with added savings in capital, equipment, and space.

4. Contractural Services

The Branch will continue use of contractural services, with special emphasis on service-type contracts. One such contract with the Beckman Corporation, Spinco Division, has been most beneficial to the scientific staff. Other such contracts involving specialty instruments are in the planning stage.

5. Technical Assistance

This program provides temporary (up to four weeks) manpower to the researcher to assist him in some technical phase of his project. Efforts so far have been limited to the professional assistance provided in the Beckman Contract and assistance provided by Branch technicians. Lack of available manpower has further restricted this program. It has proved to be a valuable and beneficial service, however, and the program will be extended when manpower makes it possible.

6. Instrumentation Survey

Earlier this year a survey of scientific instruments at NIH was made to forecast accurately the requirements for servicing these instruments. The information for the survey was obtained from the property inventory in SMB. It showed scientific instruments worth approximately $21 million on the station. These were divided into about 50 generalized categories and 3,000 types. The present system of cataloging and nomenclature is inadequate for the purpose intended. Some new means of documenting this information should be established to provide the pertinent information in a usable form for property management, inventory control, and the individual laboratories and services at NIH.

The Program Analysis Branch, Office of Development, Bureau of State Services, USPHS, has developed a documenting technique that seems to have great merit. SMB will be urged to explore the possibility of adopting this technique.

7. Inventory

This year the Branch inventory was capitalized, and inventory record keeping was transferred to the computer. The immediate benefit is that for the first time a history of usage is available that will be used to determine the "economic order" quantity. This should materially reduce the frequency of ordering, assure adequate stock on hand, and reduce manpower requirements to perform this function.

F. Publications, Patents and Presentations

1. Publications

Carmeci, P. and Jorgensen, R.: Sonograph recording techniques. J. Acoustical Soc. America 36: 1959-1961, Oct. 1964.

Friauf, W. S.: Dynamic characteristics of analog to digital converters. Instruments and Control Systems 38: 111-114, Jan. 1965.

Norris, G. and Carmeci, P.: Isotonic muscle transducer. J. Appl. Physiol. 20: 355-356, March 1965.

Riggle, G. C. and Rector, D. A.: Portable densitometer for establishing cleaning standards. Mod. Sanitation & Bldg. Maint. 16: 44-45, Aug. 1964.

2. Patents

No report.

3. Presentations

Riggle, G. C.: Recent instrumentation developments in clinical and biomedical research. 2391st U. S. Army Reserve, Research and Development Unit. January 1965.

Simon, G. A.: Engineering contributions to the medical sciences. Delaware American Society of Mechanical Engineers and the Institute of Electrical and Electronics Engineers. January 1965.

Riggle, G. C.: Recent instrumentation developments in clinical and biomedical research. Northwestern North Carolina Subsection of the Institute of Electrical and Electronics Engineers and the Professional Technical Group on Bio-Medical Electronics of the North Carolina Section. January 1965.

Fogle, J. L. and Metz, H. D.: The engineer's contribution to medical progress. Cumberland Section of the Instrument Society of America. January 1965.

Cohen, G. S.: Contributions of engineering to research in Parkinson's disease. The Engineers' Club of Philadelphia. March 1965.

July 1, 1964, through June 30, 1965

PUBLIC HEALTH SERVICE - NATIONAL INSTITUTES OF HEALTH

DIVISION OF RESEARCH SERVICES

Summary of Branch Activities

1. DRS-9
Serial Number

2. Library Branch
Branch

3. Jess A. Martin
Branch Chief

I. SUMMARY

The twelve months covered by this report saw new programs initiated for the first time and others completed that had their beginning in Fiscal Years 1963/64. New programs included internship, bibliographical services, automation feasibility, and workload reporting. Projects continued and completed included journal and book inventories, design of new library facilities, and the reorganization of certain services.

Many important recommendations were presented by the Library Advisory Committee during the year to the Chief, Division of Research Services, and to the Director of Laboratories and Clinics for NIH. These recommendations resulted in consideration being given to new circulation, photocopy and bibliography policies. These new policies and other program adjustments resulted in the application of improved management techniques which have permitted the introduction of a vastly improved library service approach.

Changes in the Library's program, policies, and methods of operation were geared to the one dominant concept of providing dynamic, rapid, and high-quality service to the research staff of the National Institutes of Health.

II. BRANCH PROGRAMS

A. Objectives

The primary mission of the Library Branch is to operate an efficient, comprehensive library to support the research programs and administration of the NIH Institutes and Divisions. Its activities include the acquisition, processing, maintenance, and circulation of library materials; the operation of a photocopying service; the provision of information, reference, and bibliographic assistance; and the provision of a translating service for foreign scientific literature. To fulfill its mission effectively, the Library must be responsive to the ever changing literature needs of the NIH investigator and knowledgeable of the current information retrieval, manipulation, and dissemination methods applicable to library procedures and services.

B. Current Programs

Readers Services

Readers services for the NIH staff include reference and bibliographic assistance, circulation of literature, photocopying, and translating.

The reference staff compiles short bibliographies on specialized subjects and performs comprehensive literature searching as requested by NIH investigators. In order to answer the multitude of inquiries for specific information, the reference librarians endeavor to keep abreast of the activities of NIH and other research institutions and of biomedical developments through attendance at lectures, personal reading, and course instruction. In this way they are also strong contributors to the book and journal selections program. As much personal contact with the scientist/user as possible is maintained in order to appreciate better his specific needs.

The Circulation Unit, through constant surveillance of the collection and its use, maintains the materials in such manner as to encourage greater and easier access for the patron. Extensive use of the photocopy service within the Circulation Unit allows greater and more frequent use of circulating library literature. A considerable activity of this unit is the interlibrary loan program, which makes available books and journals not found in the NIH Library but required by NIH scientists.

Another vital readers' service offered is the translation of foreign language articles into English. Most of the European languages are handled by several of the staff translators. Other languages are translated by contractors with the NIH Library handling the arrangements.

Technical Services

Technical services include the acquisition of books, journals, and other printed materials needed to support the research efforts of NIH scientists and the processing of these materials for use. Processing of books includes classification, subject and descriptive cataloging, and physical preparation. Processing of periodicals includes recording by title, volume, and issue number and a certain amount of physical preparation other than binding. Constant review and revision of the public catalog, periodical records, and other internal records is necessitated by the changing needs of the scientist/user. A gift and exchange program permits valuable materials to be added to the collection at little cost to the Library. An extensive binding program improves the availability and useability of the collection.

Bibliographical Services

Although the concept of bibliographical support for the scientist through close liaison with the programs of the Institutes was approved in June 1963, this program has only been given token implementation. When it is fully implemented, the staff of the Bibliographical Services Section will plan, develop, and supervise bibliographical services functions, including bibliographical support to the scientist at the intellectual level he requires. Also included will be programs of mechanized information handling and coordination of these with existing programs at the Computation and Data Processing Branch, NLM, and other government agencies.

C. Program Progress and Accomplishments

An inventory of the journal collection was completed in the latter part of FY 1964, and the book inventory which was started in September 1964 was completed in May 1965. As a result of the inventories, the collections and the records reflecting the book and journal holdings of the Library are better organized and easier to consult.

The first librarian internship program began on August 31, 1964, with the arrival of two interns from Western Reserve University School of Library Science. These interns were given rotating work assignments in all units of the Library. The interns were provided an opportunity to gain broadly-based work experience upon which to build a career in librarianship and information handling while making a substantial contribution to the service program of the NIH Library.

An automation feasibility study was conducted by the Management Policy Branch, and the final report entitled "Feasibility of Automation in the NIH Library" was submitted on February 8, 1965. The report recommended computerization of the repetitive processes within the Library, e.g., serial recording, acquisitions, cataloging, and circulation.

The planning phase of the new library facility moved into its final stages with the presentation of the completed architectural drawings in mid-April 1965. Planning also included the development of lists of new equipment needed for the new Library and written specifications covering that new equipment.

Workload reporting using the end product system was recommended by the Management Analysis Officer, DRS, after completing a study of the existing library reporting techniques. Under the end product system, the average processing time is the estimate for each end product, and the standard man-hours produced in an activity represents the overall estimate for that activity. The end product system can be used where the work processes are recurring and are relatively short-cycled (not more than 50 man-hours).

Extensive training of NIH Library staff members occurred during FY 1965. Three groups of supervisors selected from the Library staff participated in grid management courses in 1965. Other training included course work in scientific German, biochemical genetics, and information handling. This training was welcomed by the members of the staff and has made them aware of new and better management and information handling techniques and systems.

A meeting of the Washington, D.C., Area Medical Library Group was sponsored by the NIH Library on January 29, 1965. Some 250 medical librarians attended from 17 states and the District of Columbia.

Readers Services

1. Photocopying Service. Two Xerox 914 photocopiers are used to fill urgent photocopy requests of 20 pages or less. Longer articles are photographed, processed, and then printed by the Xerox Copyflo. The Library Advisory Committee and the Scientific Directors evaluated the use of the photocopy coupon system instituted on April 1, 1964, for an initial trial period of six months. At the end of the trial period the determination was made that the coupon system had met its objectives of providing more effective use of the photocopy service and of identifying more clearly the photocopy requirements of the library patron. The coupon system has made it possible for the Library to service all requests and to keep abreast of current needs with no additional personnel or equipment.

2. Interlibrary Loan. During 1964, 4,818 volumes were loaned to other libraries and 10,858 volumes were borrowed from other libraries throughout the United States for NIH personnel. Translations loaned to libraries totaled 2,438 in 1964.

3. Orientation. During 1964, general explanations and tours of the Library were given to 90 patrons, in groups of one to forty. Guidance and instruction relating to methods of literature searching, indexing, abstracting, and specific information problems were given to 360 investigators. Immediate orientation service is provided whenever possible. The 1965 revised edition of the NIH Library Guide, available now, is helpful to this program.

4. Reference Service. Experienced reference librarians with specialized science backgrounds are a part of the library staff. Much emphasis is placed on supplying immediate answers to reference questions asked by phone or in person. Reference librarians scan regularly the current scientific literature to keep abreast of trends and developments in the sciences. Assistance in the book selections program is an important activity of the reference librarians. Included in this program is a continuing search of journals, publishers' catalogs, national book catalogs, and announcements for current in-scope publications needed for the collection.

During the year a Selections Review Committee was appointed. The Committee, consisting of the Chief, Library Branch, the Assistant to the Chief, the Chiefs of Readers and Technical Services, and the Head of Acquisitions, reviews all selections made by the reference librarians who presently select new materials for the NIH Library collections. Certain scientists at NIH have been asked to serve on the Review Committee, which meets once a week. It is felt that a better job of selecting can be done by the Library staff if the extensive knowledge of the NIH scientist concerning the scientific literature can be utilized by the selections personnel.

Fifty-three bibliographies requiring extensive searching were prepared by the Reference Unit on specific subjects requested by NIH investigators as were bibliographies of bibliographies, biobibliographies, and short reference lists. Two bibliographies entitled "Design of Clean Rooms" and "Cancer in Subhuman Primates" were issued as a part of the Public Health Service Bibliography Series.

After April 2, 1965, all requests for bibliographic searches demanding more than eight hours of library staff time were required to have the prior approval of the Institute Director, Division Chief, or Scientific Director or their designees. It is anticipated that this new policy, on trial for six months, will reduce the unauthorized use of time of the reference librarians and will allow them to devote greater attention to the legitimate requests that are submitted daily.

5. Circulation. A continuing effort was made to effect a prompt return of library materials when due. Overdue notices were mailed, then followed by phone calls and memoranda when necessary. As a result, many long-overdue books were made available on the library shelves.

On November 9, 1964, journals for which only single copies could be found in the Library were restricted to in-house use. The new policy has made available for immediate use greater quantities of library literature. One loan period was established for all types of library material. This policy eliminated the confusion caused by having different loan periods apply for different types of materials borrowed.

The circulation of translations, both retention copies for DHEW personnel and loan copies to libraries, is now handled by the Circulation Unit. Retention copies of translations that were circulated totaled 3,204. The transfer from Translating to Circulation of the filing, storing, distributing, and lending activities occurred during this reporting period. This transfer has allowed the Translating Unit to clear a tremendous typing backlog.

A borrower's file was introduced at the Circulation Desk during March 1965. The new file will make it possible for the staff to obtain immediately the titles of library material out on loan to any individual borrower. The borrower's file will be useful for clearance of NIH personnel, will expedite the sending of overdue notices, and may be used as source information for certain statistical and subject reviews and studies.

6. Translating. The NIH Translations Index, 1954-1963 was given wide distribution during the year. The 1964 supplement to this Translations Index was prepared and issued in June 1965. The supplement includes a subject index and a list of journal abbreviations. The supplement was distributed to those who received the Translations Index. All hard copy translations on file from 1954 that were listed in the Translations Index were microfilmed during the year. Translations that once occupied seven filing cabinets now occupy less than one drawer of one filing cabinet.

Of the 500 articles translated per year, an estimated 75 are sent out on contract. Oral translations for the year consumed approximately 550 hours, including person-to-person orals and recordings.

Technical Services

1. Acquisitions. Use of the blanket order method of acquisitions continued to save much staff time and effort. Under this plan, in-scope books are received on approval from reputable publishers of medical and scientific books and from certain dealers. This system of ordering books has lessened delay and has eliminated much paper work. Continued consolidation of numerous separate files has eliminated duplication and has resulted in a considerable savings in staff time.

During this 12-month reporting period, the Library's collection was strengthened by the purchase of approximately 6,000 new books and by the receipt of 500 books through gift or exchange. For 1965, the Library placed subscriptions to more than 2,000 journal titles, with an additional 800 received through gift or exchange.

A 170-page want list of the missing and needed periodicals discovered during the journal inventory was compiled. Seven hundred and forty items on this want list have already been received in the Library as replacement issues.

2. Cataloging. Routines have been simplified considerably during the year. The work of revising the "Periodical Record" and all attendant records involving wording of title entries was performed by cataloging personnel.

Revision of the former "Serial Record," now the "Periodical Record," was interrupted intermittently during the year because of other record revisions made necessary by work on both book and journal inventories. However, some progress was made with the revision of the Periodical Record. The completion of a study by the Management Policy Branch on the feasibility of applying automated procedures to reduce the manual repetitive processes of periodical recording resulted in recommendations that a computer be used. In anticipation of computerization, complete revision of the manual Periodical Record has become even more important.

All record changes occurring as a result of the inventories of the collection were handled by catalogers. During the year, 3,300 sets of catalog cards were withdrawn from the public catalog and shelflist while another 2,000 were revised.

Bibliographical Services

One Liaison Officer, assigned to NIAID in April 1964, was kept busy during the half-time that he was able to devote to the literature needs of the scientists of the Institute he serves. The other half of his time was spent in the indexing and searching training programs of the National Library of Medicine. This training is designed to prepare him for handling MEDLARS tapes planned for transfer to the NIH Library.

A second Liaison Officer was assigned during May 1965. The second assignee, like the first, is a Biologist who is trained in the sciences. This training provides them the background needed to understand and interpret better the requests for bibliographic assistance that are received from the laboratory scientists at NIH.

D. Problems

The greatest problems faced by the NIH Library still result from turnover of personnel, lack of personnel to develop new programs, and the need for space. During the period covered by this report, 12 of the clerical and subprofessional staff and 5 of the professional staff left the employ of the NIH Library. Reasons given for resigning would suggest that a general upgrading of the clerical and stacks maintenance positions, with higher beginning grades, would help resolve the problem by attracting better-qualified employees.

During the same period, no new positions were assigned to the NIH Library, and yet two new programs were launched. The first Internship Program requiring two positions was introduced, and two employees were assigned to Bibliographical Services. Staff for these programs were transferred from other programs within the Library.

Too little and inadequately designed space for library materials and services still cause the Library staff and the scientist/user great concern. The present Library is congested, noisy, and hard to supervise. The security system could be strengthened if the Library could afford to establish a second checkpoint. Unfortunately, no personnel slot is available for such a position. The majority of these space and security problems will be solved when the new Library is occupied.

E. Program Plans

Planning the move to new Library facilities in late 1966 has high priority. Detailed specifications, bids, acquisition of new equipment, and plans for the physical move of existing equipment, bookstacks, collections, and the Library staff will receive attention.

Further implementation of the Bibliographical Services Section and the selection of a Chief and several additional Liaison Officers is planned. The Library's program effectiveness will be enhanced with a coordinated liaison service and with better understanding of the literature needs of the Institutes and Divisions. Manipulation of the MEDLARS tapes when received by the NIH Library and the interpretation and formulation of requests for MEDLARS searches will be assigned activities of the Liaison Officers. Service of this type is being requested, and the Library program should respond to the requests. Inquiries from four Institutes and one Division have been made concerning the possibilities of this new service approach.

A second medical library internship program conducted by the NIH Library is planned for 1965/66 beginning on August 30. The two interns selected for the program will receive a practical understanding of all levels of librarianship in each area of the Library while making worthwhile contributions to the Library.

Consideration will be given to a gradual development of an automated system for repetitive processes in the Library. It is planned that a Library staff member will be trained as a systems analyst to work with Computer Division programers toward automation of the periodical recording, acquisition, cataloging, and circulation procedures.

Introduction of a system of workload measurement is planned for FY 1966. A management analysis study recommends that the Library adopt an end product system. It is believed that effective workload measurement will streamline reporting and recording processes within the Library.

An investigation will be conducted into the possibilities of electronic transmission and printout of information from area libraries and from the Library to off-campus offices.

F. Publications

The Translating Unit. Laboratory Management 2: 28, 43, Sept.-Oct. 1964.

Compiler: Luther, M. Cancer in Subhuman Primates. U. S. Dept. of Health, Education, and Welfare, Public Health Service Publ. No. 1138. Washington, D.C., U. S. Govt. Print. Off., 1964. 61 p.

Compiler: Fox, G. Design of Clean Rooms, A Classified List of Selected References 1955-1964. U. S. Dept. of Health, Education, and Welfare, Public Health Service Publ. No. 1219. Washington, D.C., U. S. Govt. Print. Off., 1964. 15 p.

U. S. National Institutes of Health. Library. NIH Library Booklist. Bethesda, Md., 1965. Bimonthly.

U. S. National Institutes of Health. Library. NIH Library Guide. U. S. Dept. of Health, Education, and Welfare, Public Health Service. Washington, D.C., U. S. Govt. Print. Off., 1965.

U. S. National Institutes of Health. Library. Periodicals Currently Received in NIH Library 1965. U. S. Dept. of Health, Education, and Welfare, Public Health Service Publ. Washington, D.C., U. S. Govt. Print. Off., 1965.

U. S. National Institutes of Health. Library. Recent Translations, A Selected List. Bethesda, Md., 1965. Monthly.

U. S. National Institutes of Health. Library. Index of Translations. Supplement I. Washington, D.C., U. S. Govt. Print. Off., 1965. Annual.

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